March 15, 1943

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1982

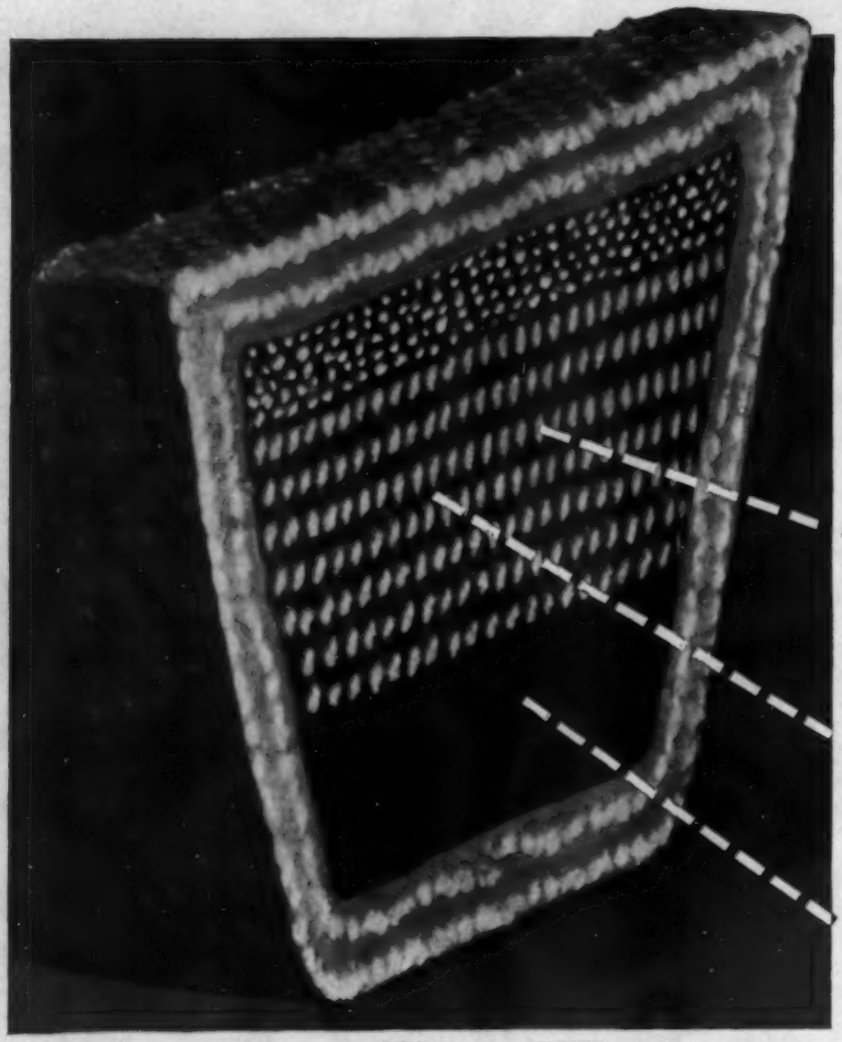
MESTA ROLLS for Three High Plate Mills

SMOOTHER SURFACE—LONGER LIFE

★ ★ ★

MESTA MACHINE COMPANY, PITTSBURGH, PA.

Here's a Slice of LONGER V-BELT Life!



It's the section of a new Texrope Super-7 . . . and the new ways Longer Life is Built right into it Point to ways *You* can make Your V-belts last Longer.. whatever Brand you Use!

V-Day needs every V-Belt

50% STRONGER CORDS produced by the new Flexon process combat stretching. **YOU** can fight stretching—and the slip and burning that result — by promptly taking up any slack that may develop. Remember, many V-belts are now working four times as many hours a week as in peacetime, may need inspection *four times as often!*

★

20% MORE CORDS than before help protect the new Texrope Super-7 against strains and breaks. **YOU** can minimize breaks in your plant — whatever make of V-belts you use — by requiring that V-belts *never* be pried into grooves. For V-belts, prying is a back-breaking operation!

★

COOLER-RUNNING CUSHION of special rubber "eases" cords around sheaves—for smoother flexing and less heat. **YOU** can fight heat by preventing misalignment. It causes rubbing of belt sides, extra heat and shorter V-belt life. So keep sheave grooves in line—shafts parallel.

★

WHEN YOU DO NEED new V-belts, *invest in the best* — Texrope Super-7!

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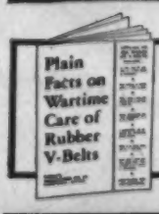

FREE! Every engineer should have this valuable new handbook in his technical library.

It applies to *all* makes of V-Belts—contains no advertising. Write Allis-Chalmers for it *now!*

ALLIS-CHALMERS

TEXROPE SUPER-7 V-BELTS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

*Trade mark registered U.S. Patent Office. Texrope Super-7 V-Belts are the result of the cooperative research and design genius of two great companies — Allis-Chalmers and B. F. Goodrich — and are sold exclusively by Allis-Chalmers. Available in all sizes.....½ h.p. to 2,000 h.p.

4 WAYS to get more service from WIRE ROPE

Yes, wire rope is tough. It can stand up to the most rigorous service—and ask for more.

But that's no reason to abuse it. With a little care, by applying a few simple rules, you can get a tremendous amount of extra service from your rope.

1 Break it in with light loads

For example, when breaking in a new rope, don't slam on full power and speed right off the bat. Begin with fairly light loads. Operate at moderate speed. Give the strands of the rope a chance to seat down snugly and uniformly upon the core, so that each strand is carrying its fair share of the load. This way, the rope will assume its proper "constructional stretch" without damage, and you'll be assured of better spooling and easier handling throughout the entire life of the rope.

2 Treat it with consideration

After the rope is broken in, you can safely use whatever speeds and loads it was designed for. But don't be unnecessarily rough, even then. A smooth, gradual application of power is just as efficient as slamming into the load with a jerk. The same is true of braking. It's the heavy jerks and surge loads that beat the guts out of a piece of rope. Nine times out of ten these can be avoided without losing time.

3 Know your rope

For example, if you're using a flexible 8-strand rope for high-speed work, don't overload it. This rope is built to withstand bending fatigue and fast operation—not for heavy hogging lifts. The opposite is true of heavy-duty 6-strand rope. Lift with it—but don't try to break speed records.

4 Right maintenance means plus service

Don't neglect the few simple maintenance precautions which require so little time yet return so much in extra service. Keep your rope properly lubricated. Don't operate it over sheaves that are abraded, damaged, or out of line. Fasten clips in the approved manner. Cut off a short length from the drum end of your rope from time to time so that "grief spots" are relocated over sheaves and drums.

Wire rope is now a war weapon. Its proper use is a service to your country and to yourself. If you want good, dependable rope, and friendly service, get in touch with the Bethlehem Wire Rope distributor in your territory. He's always ready and willing to serve you.

Bethlehem Manufactures Wire Rope for all Purposes

THEY COULD USE THIS

THAT HALF-TRACK can be mighty useful, on a farm or construction job. It can save time and back-breaking work, in a hundred and one ways. The men in our armed services realize it. They're waiting for a chance to use it, back home.

OTHERS SEE the utility of planes, jeeps, powerful trucks for peacetime pursuits. Homemakers will clamor for better equipment for comfort and convenience. And they'll have the money to buy, invested in War Bonds or otherwise.

BUT they'll be cagey shoppers, we think. They won't be satisfied with the old. They'll be looking for manufacturers to apply the lessons of war to peacetime goods. The pressure now is for deliveries. The postwar demand will be for more over-all utility, at a fair price.

WE DOUBT that this country's present machinery will do the job. Much of it is years old, depreciated even before the War. Heavy loads and long hours have reduced the value of new machines. New developments will cause a high degree of obsolescence, even of equipment still in good order.

SO, the manufacturer will be a jump ahead of his competitors, who starts now to study his postwar facilities. He'll find out what machinery he can use, what is outworn or outmoded. He'll plan to use the most productive machinery he can obtain.

TAX AUTHORITIES CAN HELP, by considering the rapid rate of depreciation and obsolescence, and by permitting the reservation of "seed money" so that funds will be available when new equipment is obtainable.

WE SHALL LOSE MUCH of the value of our native ingenuity if we are not ready to apply it to peacetime pursuits. Only the production of more goods for more people, by means of modern machinery, can bring us work, contentment, and lasting freedom.

THE MONARCH MACHINE TOOL COMPANY · · · SIDNEY · OHIO

MONARCH LATHES

Cover the Turning Field

back on the FARM

BEHIND THE SCENES

Too Late Now

■ If by the time your good eye focuses on this 8-point Caledonia type you haven't yet filed your 1942 income tax return, about our only suggestion is that you quick start developing an acute case of amnesia and have your brother-in-law notify the Bureau of Missing Persons that you haven't been seen for six weeks.

Blood From A Turnip

■ Of course, when they start this new withholding tax that is being churned up in the House it's going to be as painless as extracting an impacted wisdom tooth, provided there's anything left to withhold after all the other deductions which even now leave just about enough for a short beer every other pay day. Personally, we're in favor of that single tax idea which someone or other is sponsoring. Then you can just endorse your whole check over to the man with the whiskers and not have to worry about all the gory details.

Wartime Suspension

■ Last Thursday, March 11, STEEL's contemporary or sister paper, *Daily Metal Trade*, suspended publication for an indefinite period after a continuous appearance five days a week since 1909. As a matter of fact, the relationship between STEEL and the *Daily* was originally even much closer than that of brother and sister, for it was as a daughter of STEEL that the *Daily* first saw the light of day.

By 1909 STEEL (then *Iron Trade Review*) had been serving the metalworking and metalproducing industries every week since the French had first begun the Panama Canal in 1882. It was a time of rapid development of the age of steel and metals. The open hearth was replacing the bessemer as a volume producer of steel and improved refining methods for the nonferrous metals were being developed. A great new industrial era was at hand and into it was born the *Daily Edition of Iron Trade Review* under the editorship of the late J. F. Froggett, for those companies requiring daily market information.

STEEL's child matured rapidly and won its independence in a few short years, dropping its last name to become *Daily Iron Trade* and after the war, *Daily Metal Trade*—"The Newspaper of the Metal Industries".

Suspending the *Daily* cannot help but bring a tug to its mommy's heart as well as its thousands of friends who have read it with such avid appreciation that it has long enjoyed one of the highest, if not the highest, subscription renewal rates of any publication audited by the Audit Bureau of Circulations.

But notwithstanding this appreciation, which is and has been most gratefully acknowledged, the operation of a daily newspaper imposes a heavy strain upon publishing facilities in wartime. It is the studied opinion of the publishers of STEEL, *The Foundry*, *Machine Design* and *New Equipment Digest* that their contribution to the war effort can be increased substantially by transferring the talent, skill and facilities heretofore devoted to the *Daily* to more fully serve the readers of these four publications.

After the pressure of wartime conservation has eased, the possibility of resuming the *Daily* on a better and broader basis will be carefully considered.

Thus STEEL will continue its weekly coverage of the metalmarkets and its news reports on the industry on an expanded basis, utilizing the full facilities of the *Daily* to give you the most complete information service available.

Say It with Wrenches

■ Women in war plants create many a new problem as we have pointed out here from time to time but one which had escaped our operative's eagle eye until he was visiting down at Westinghouse is the modern version of the stage-door Johnny. Call him what you will—Plant Gate Jerry or Swing Shift Sam, here he is in all his glory, tenderly holding

a beautiful pipe-wrench bouquet and ready to whisk his lady love away to see his etchings just as soon as she gets the grease out from under her fingernails.

War Production Handbooks

■ The following reprint handbooks are still available from STEEL's Readers Service Department and will be sent promptly. Altogether, over 15,000 copies are now in use throughout the industry and in the district ordnance offices:

Modern Shell Production	**$1.50**
Modern Gun Production	**1.00**
Modern Small Arms	**1.00**
How To Improve Your Welding	**2.00**
Improved Forging Technique	**1.00**

The three ordnance handbooks are available as a set at $3.00, and soon to be ready will be the NE Steel Handbook and NE Steel Selector at $1.50. Advance orders are piling up for delivery early in April.

Vol. 112, No. 11, March 15, 1943, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

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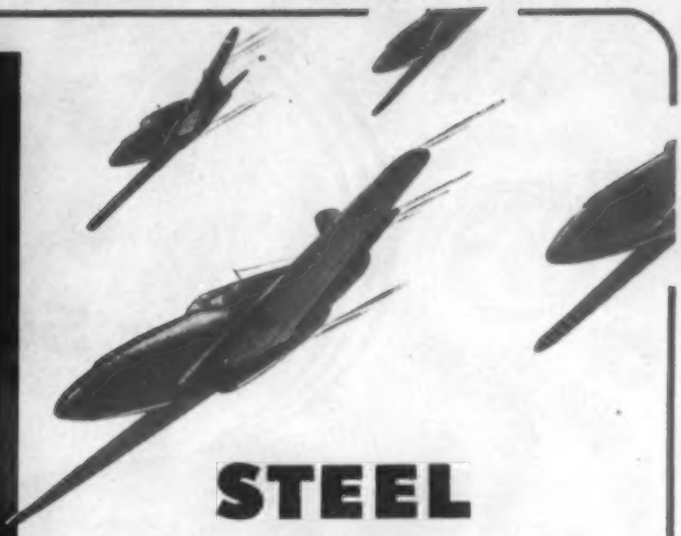


STEEL FOR 57 MORE FIGHTER PLANES

★

from a single
HEARTH PATCH
bottom repair

WHEN you repair a large, deep hole in an open hearth bottom with Hearth Patch, you may save 10 to 12 hours—most of the time it would take to burn in layer upon layer of magnesite.

In that time saved, the furnace can make an extra heat of steel—enough steel from a 200-ton furnace, for example, to produce 57 fighter planes.

Every month more steel plants are using Hearth Patch for emergency repair work. Over 40 shops have ordered it since Pearl Harbor. Some average a carload or more per month.

Hearth Patch is a dense, fine-grained, quick-setting magnesite refractory that you simply shovel or dump into the hot furnace. You mix no slag with it. Just clean out the bottom hole carefully, fill it level full of Hearth Patch. Dress the repaired area with two inches of burned dolomite or magnesite, and the entire patch consolidates quickly into a solid repair.

Hearth Patch has its limitations. Don't put it in a cold furnace. And if you use it for bank repairs, mix slag with it.

Basic Service Engineers, who are helping many shops to save hours of production time with Hearth Patch and other Basic Refractories' products, will be glad to aid you, too. Think of these long-experienced, practically trained men as your refractories specialists.

BASIC REFRACTORIES, INCORPORATED
CLEVELAND, OHIO

PRODUCERS OF MAGNESITE AND DOLOMITE HEARTH MATERIALS FOR STEEL FURNACES

Scrap is needed to make steel. Steel, more steel, is needed by the Armed Forces to bring Victory.

If you have old machinery that can't be used to produce War Materials, turn it over to your local Scrap Dealer. He will see that it reaches the steel producers. All trimmings and short ends of steel you have left over should be collected and stored until such time as you have a full load. Then call your Scrap Dealer. Make sure he picks it up, at once. In this way you can aid the steel producers, our Armed Forces and yourself.

Keep the Scrap coming.

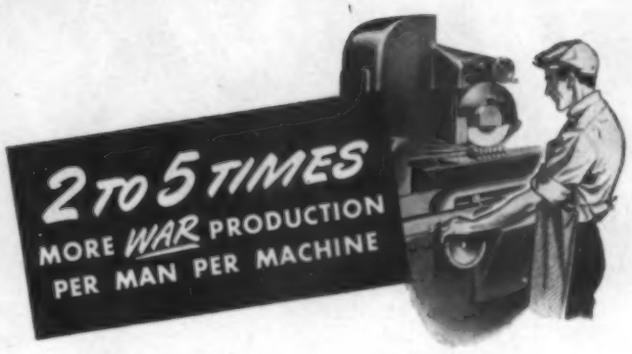
WEIRTON STEEL COMPANY—WEIRTON, WEST VIRGINIA

Sales Offices in Principal Cities

division of NATIONAL STEEL CORPORATION

Executive Offices, Pittsburgh, Pa.

IMPORTANT NOTICE TO WAR PLANTS CONCERNING POR-OS-WAY DELIVERIES



WE MUST BE FRANK. When we first announced the Por-os-way precision grinding wheel a little more than a year ago, we were ready with a plant far exceeding our previous one in size, equipment and man-power. It was, we felt, big enough to meet all demands. But two things have happened. First, the war. Then Por-os-way, making good its promise to increase grinding production 2 to 5 times per man per machine, has literally sky-rocketed in demand. Hundreds of grinder foremen and grinding machine operators want to prove Por-os-way can up production 2 to 5 times for them, want to see what makes it different from other wheels, how its cool action practically eliminates burning, how it takes cuts double or more than previous wheels and grinds in fewer passes, how it can cut faster producing an even *better finish using a finer grain*, why it resists loading, holds its corner, reduces dressings necessary.

ORDERS INCREASED 700%

Orders have poured in. Not at a steady pace but at an ever increasing rate. Our production is now forging ahead—yet is still not enough to satisfy the full demand for Por-os-way.

RELIEF IS IN SIGHT

Working 'round the clock was not enough. We needed more plant, more equipment, more men. Work on expanding our facilities is now completed. Greatly increased production is now under way. Again we believe it will be amply big enough to take care of all your demands. Naturally we want every war plant to know the exceptional advantages of Por-os-way wheels. And so, we're doing all we humanly can to keep up on delivery. In the meantime, write A. P. de Sanno & Son, Inc., 436 Wheatland Street, Phoenixville, Penna. for a booklet "Facts About Por-os-way". It gives a complete story.

POR-OS-WAY* *a new* **RADIAC* PRODUCT**

A. P. DE SANNO & SON, INC.
NEW YORK, CHICAGO, PITTSBURGH, CLEVELAND, DETROIT, LOS ANGELES

PHOENIXVILLE, PENNA.
Western Gateway to VALLEY FORGE

*T. M. Reg. U. S. Pat. Off.
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1917 - 1943

AGAIN ---

History repeats itself

IF YOU ARE . . .

Drilling, reaming or rifling gun barrels * Machining shells Thread grinding * Honing Machining aluminum or magnesium Shaping gears * Machining other tough jobs

Consult Houghton on Cutting Fluids

USE HOUGHTON'S CUTTING

Once more industry turns to cutting concentrates to save needed shipping space

Buy the BASE and SAVE the SPACE

During the dark war days of 1917 the railroads, sorely pressed, were forced to place embargoes on many materials. Some way had to be found to keep machine shops supplied with the cutting oils they required in increasing quantities for war production.

It was then that the Pressell patent (1367428) was granted to E. F. Houghton & Co., on a cutting oil base which contained the necessary extreme-pressure ingredients to increase film strength, oiliness and heat absorbency. This base was shipped to the user's plant and mixed there with blending oil obtained locally.

Down through the years this method of making superior cutting oils has continued. We have supplied thousands of tons of cutting concentrates, high in the right type of sulphur, saponifiable and E. P. properties.

This means that one drum will make from two to ten drums of mixed oil, ready to cool the operation and make tools last longer.

Today history repeats itself. The common carriers—railroads and trucks—have done a marvelous job to meet war demands thus far. But the time has come when shipping space is probably America's greatest shortage . . . when every possible car must be conserved to move the materiel of war and the food and fuel for our home front.

By buying the treated base oil and mixing it with a locally available straight-run refinery product, shipments of cutting oils can be cut to one-third or even one-fifth of the present volume. Too, metal drums are getting scarce —which is another reason for conserving.

"BUT, WHAT BASE?"

This company, with a quarter-century record on cutting fluids, has long since proven its right to speak. We make our own ready-to-use oils the same way and supply both these oils and the concentrates to American industry for every conceivable type of tough machining.

Why not ask the Houghton Man for his recommendation—buy the base material made as only Houghton knows how to make it—and thereby save time and shipping space for other materials vitally needed for Victory?

E. F. HOUGHTON & CO.

Industrial Oils and Heat Treating Products

Chicago • PHILADELPHIA • Detroit
San Francisco • Toronto

CONCENTRATES

Aim this

at threats to stud setting speed and efficiency!

HERE's an Apex stud setter of brand new design, with the smallest O.D. we know of. It works close to shoulders, projections, etc., drives easily and accurately in tight spots normally hard-to-reach. Proves to be a simple, effective tool for either hand or power operation. *Important:* It's an ideal tool for "green" hands. It's easy to adjust, and once set for desired length of thread on stud, *stays adjusted.*

Four sizes supplied for studs up to 1¼" in diameter. Your choice of Morse taper shanks, hex drive, T-handle combination with female square for torque wrench.

Stud setters are only one branch of the Apex family of fine production tools. Write for any of these catalogs listed below.

Chuck and tool holders: Catalog No. 14; Power bits and hand drivers for Phillips screws: Catalog No. 15; Power bits for slotted head screws: Catalog No. 16; Power bits and hand drivers for clutch head screws: Catalog No. 17; Stud setters: Catalog No. 101.

APEX

THE APEX MACHINE & TOOL CO.. DAYTON, OHIO

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft Universal Joints, Plain and Universal Joint Socket Wrenches.

Control...

THE CRITICAL FACTOR IN MINESWEEPER OR STEEL CASTING

UNGLORIFIED . . . rarely mentioned by headlines unless it is to record her destruction . . . the minesweeper goes quietly and methodically about her task of clearing from ship channels the hidden terror whose touch is death. Officers and men of these forgotten ships must handle their craft faultlessly . . . for their first mistake may easily be their last. Only their rigid control of the minesweeper's navigation brings success in her perilous task.

The modern production of instruments of war must be as closely controlled as the minesweeper's navigation. The Lebanon Steel Foundry—producer of castings for America's armed forces—employs every production control that furthers approved foundry practice. Human control is provided by inspectors chosen for alertness of mind and vision . . . trained until they see with "camera eye" sharpness. Exhaustive chemical and mechanical tests are regularly conducted. To develop sound castings, Lebanon uses two of modern industry's most scientific tools—the x-ray (illustrated) and the gamma ray.

There is a premium on control—and Lebanon pays it to assure American fighting men and American industry of castings of Circle Ⓛ integrity . . . castings that are specified by such acknowledged leaders as Darling Valve and Yale & Towne.

Lebanon foundry engineers and metallurgists have had close contact with war production requirements since the beginning. Their experience in solving today's type of industrial problems is available to interested organizations.

LEBANON STEEL FOUNDRY • LEBANON, PA.

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

LEBANON *Stainless and Special Alloy* **STEEL CASTINGS**

GLAMOURLESS?

Maybe—

But indispensable to the WAR EFFORT SHEARED STEEL PLATE

Unsung and unheralded—yea, cold and lifeless, . . . prosaic, and truly "unbeautiful" to the eye . . .

Yet, what would we do without *Steel Plate*? . . . no ships, — no boilers, — no tanks, — no locomotives, or cars, — no landing cargoes, — no oil transportation cars, — no storage tanks, — no lighthouses, — no buoys, . . . and so on.

WORTH

WORTH STEEL CO. CLAYMONT, DEL.

LEWIN-MATHES
ROTATING SHELL BANDS
and
SEAMLESS TUBING
of Pure Copper or Gilding Metal
Our refinery and tubing mill have all the modern equipment and facilities required for wartime precision standards.
LEWIN MATHES
LEWIN-MATHES COMPANY · · SAINT LOUIS, MISSOURI

American Blower Products in the

Wheel of the Sirocco Fan extensively used in the plants of America's vital steel industry.

The prophecy, "Liberty for the World," is being written in steel made in America!

With shattering eloquence, steel is squelching the boasts of the tyrants. More than ever before in the history of America, the future of America and the future of the world depend upon the ability of this nation's steel producers to supply the enormous quantities needed.

America's war goods producers are well aware of the all-important war job being done by the Steel Industry.

American Blower has had the privilege of supplying Air Handling Equipment of many types, as well as Fluid Drives, for many of the steel plants working for Victory.

We feel that the dependable, uninterrupted operation of these American Blower products, in war as in peace, is evidence of the sincerity of our efforts to build only the best equipment of its kind for steel and other vital American industries.

American Blower plants fly the Army-Navy "E."

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN

In Canada: CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

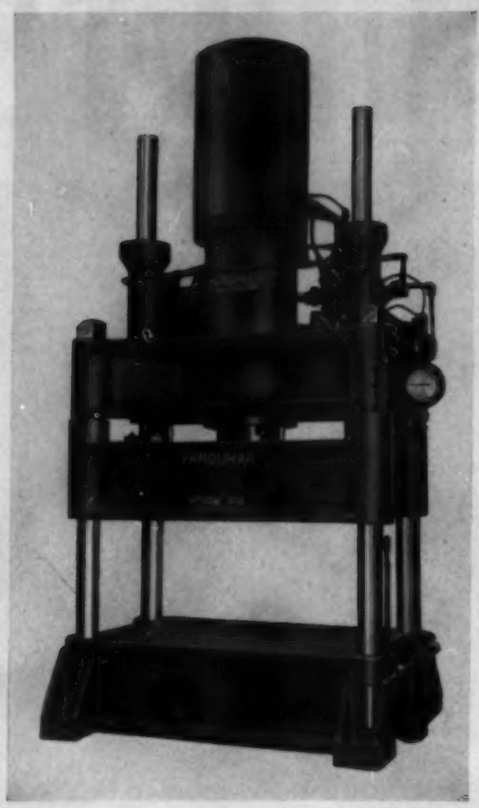
Division of American Radiator and Standard Sanitary Corporation

American Blower Induced Draft Fan for steel mills.

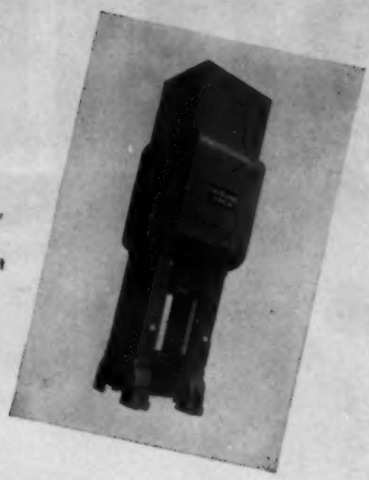
American Blower Capillary Air Washer for cooling in a large steel mill, to speed production.

STEEL INDUSTRY

All America looks to the Steel Industry for war-essential materials. A heavy duty Gas Exhauster used in the process of sintering ores in the steel industry is shown in this photograph made while the huge Fan was under construction in an American Blower plant.



Cartridge case drawing and tapering press. From 75-ton up to 250-ton capacities and larger. Double pump unit with two 60-HP motors, push-button control, adjustable strike. Manual and semiautomatic operation.



150-ton metal-forming press
Bed 36" x 58½"
Stroke 24"
20-HP pump unit

Hydraulic Presses go to war

Farquhar has built hundreds of hydraulic presses now serving in war production, all types and capacities from three to 7,200 tons. Large numbers of smokeless-powder presses bearing the Farquhar name are helping to provide the munitions of the United Nations.

Farquhar builds hydraulic presses for smokeless-powder blocking, graining, and finishing; forging and drawing presses for shell and cartridge cases; shell-nosing presses and straightening presses for gun barrels—all designs for all jobs.

For outstanding quantity and quality production of war materials the Army and Navy have awarded the "E" flag of excellence to Farquhar workers.
ARMY
E
NAVY
Awarded February 8, 1943

Farquhar

HYDRAULIC PRESSES

A. B. FARQUHAR CO., Limited, York, Pennsylvania

FOR FASTER, BETTER MILLING

A "HYPER-MILL"

ANOTHER FIRTHITE INSTALLATION

A NEW DESIGN AND AN IMPROVED CARBIDE

that . . .

Perform at extraordinarily high cutting speeds;
Permit the milling of heat-treated alloy steels;
Produce highly burnished surfaces;
Result in a high production rate.

The new design and the improved carbide are described in our "Hyper-Milling" Bulletin FE-106, which is yours for the asking.

Firth-Sterling
STEEL COMPANY

Offices: McKEESPORT, PA. NEW YORK · HARTFORD · PHILADELPHIA
CLEVELAND · DAYTON · DETROIT · CHICAGO · LOS ANGELES

Use Tungsten-Titanium Carbide

The selection of Firthite Tungsten-Titanium Carbide for milling and almost all other **STEEL-CUTTING** operations avoids the use of Tantalum—a "scarce" and "critical" material.

FIRTHITE

FIRTHITE

THE "HYPER-MILLING" CARBIDE

THIS SEA-GOING KILLER PACKS A Double Punch!

Streaking through the water at speeds of 60 miles an hour, PT Boats pack more speed and hitting power for their size than any other naval craft afloat. Their capacity to deal death and destruction — like a thunderbolt — makes them one of Uncle Sam's most feared killers of the sea.

★ ★ ★

Double Over-Arms Provide A *Dual Advantage* In Milwaukee Milling Machines

Rigidity and convenience — the Milwaukee double over-arm — scores heavily on both counts.

No other means of arbor support is quite the equal of the double over-arm in *rigidity* — an indispensable quality in any milling machine.

No other means of arbor support affords quite the same quick and easy access to the milling cutter — just a few simple motions and both cutter and arbor are free — an important convenience to the operator at all times.

KEARNEY & TRECKER
CORPORATION
MILWAUKEE, WISCONSIN

Buy Victory with at least 10% in War Bonds!

Milwaukee MACHINE TOOLS

"Breaks" LIKE THIS

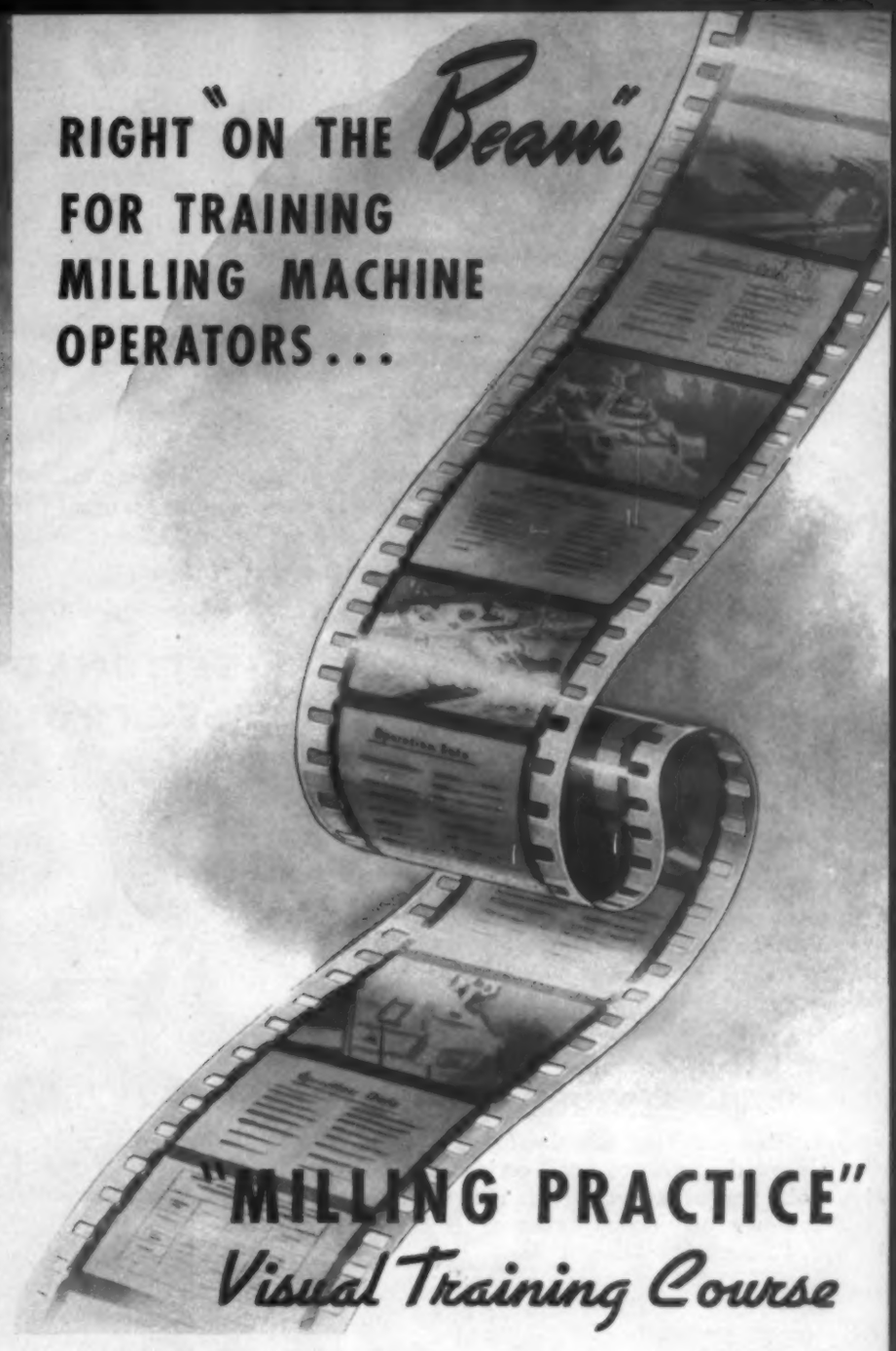
ARE NO "BREAK" FOR PRODUCTION

Broken tools—mechanical troubles — caused by improper care and operation of machine tools, are no help in production for Victory. Practically every machine tool manufacturer offers valuable advisory service — "care and operation" handbooks — technical bulletins — on better methods of operation that help green men as well as speed and improve production of skilled workers.

Put full information in the hands of the men who operate your machine tools — teach them the "know how" to get the most in production with the least waste of time, effort and materials.

Buy Victory with at least 10% in War Bonds!

RIGHT "ON THE *Beam*" FOR TRAINING MILLING MACHINE OPERATORS...



"MILLING PRACTICE" *Visual Training Course*

This Visual Training Program, consisting of five sound-slide films dealing with the fundamentals of milling practice, continues to prove highly popular with technical instructors and industrialists everywhere. Interestingly arranged, the films show many types of operations such as T-slotting, angular and straddle milling, circular milling, dovetailing, boring and end milling.

Many shop training directors report unusually successful results with this visual course. It is available on a rental basis at nominal cost. We invite you to write for full information to our Department of Industrial Education.

Kearney & Trecker *Products* CORPORATION
MILWAUKEE, WISCONSIN
Subsidiary of Kearney & Trecker Corporation

Kearney & Trecker
CORPORATION
Milwaukee, Wisconsin

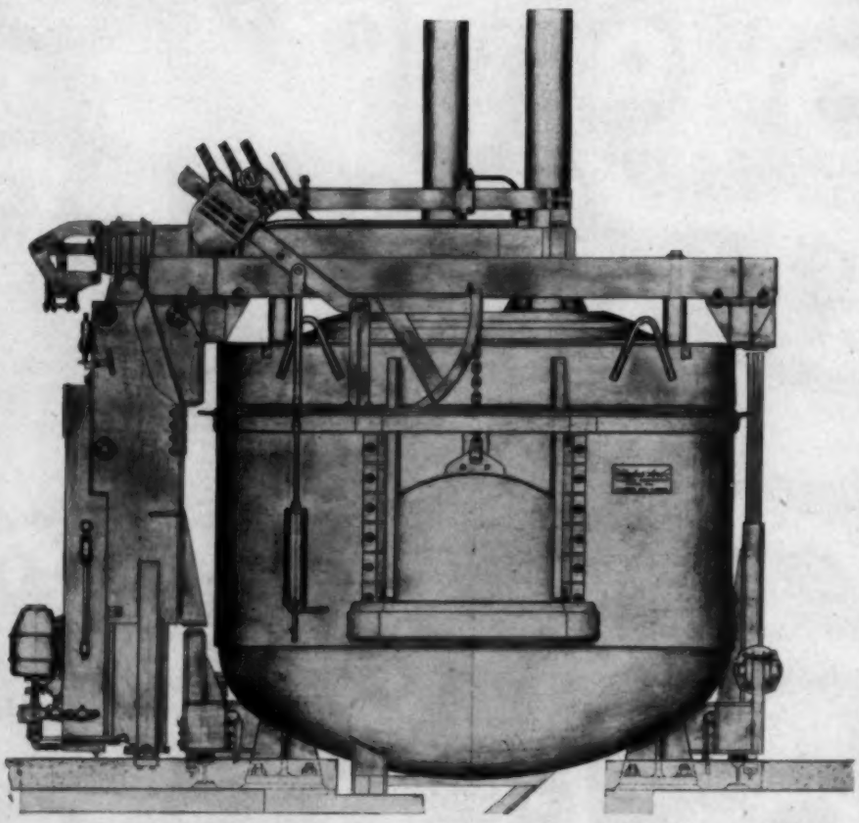
"More Important DEVELOPMENTS THAN ALL OTHERS"

"The Hydro-Arc Furnace Corporation has shown me more outstanding developments in Electric-Arc Melting Furnaces than all other organizations put together in the past twenty years", says the Chief Engineer of one of the largest users of Electric-Arc Melting Furnaces.

Two outstanding features of the Hydro-Arc Furnace are:

(1) HYDRAULICALLY POSITIONED ELECTRODES.
(2) POWER OPERATED ELECTRODE CLAMPS.

The Hydro-Arc Furnace uses low inertia air for counter-balancing to cooperate with a simple, accurate, hydraulic control to operate each electrode. The few moving parts of this combination have no stretchable steel cable nor limit switches to watch. Low upkeep—less surging—less electrode wash and more accurate metal making at lowest costs are being accomplished.



HERE'S WHAT MELTERS SAY:

1. "No climbing on the furnace among the flames to strain on burnt bolts and no swinging the sledge hammer to clamp electrodes!" 2. "Electrodes slipped from the floor!" 3. "Look at the hydraulic control!" 4. "No steel cable stretch, none to break!" 5. "Fastest electrodes I ever saw, but good control!" 6. "Simple isn't it? Can change any part in a few minutes!" 7. "Blows dust off of the electrodes as they are slipped." 8. "No troublesome limit switches on the electrode arms." 9. "Larger roof ring diameters—saves burning out flanges."

Hydro-Arc engineers will cheerfully study your Electric Melting Furnace problems and make complimentary suggestions.

HYDRO-ARC FURNACE CORPORATION

561 HILLGROVE AVENUE, LA GRANGE, ILL. *(A suburb of Chicago, Ill., U. S. A.)*
Telephones: La Grange 4545 and 4546 **Chicago Line: Enterprise 1068**

Associated with Whiting Corporation

Above: Pump liners for marine service.

Below: Special castings.

Variety of maintenance parts

SHENANGO-PENN

Centrifugal Castings

. . . an improved process for many products

BECAUSE it is an extremely flexible process, the use of centrifugal castings has multiplied many times under wartime production demands.

Wherever wheels turn, or corrosion or wearing problems exist, Shenango-Penn castings can probably be used. In marine service and the aviation industry, for example, parts formerly forged, are now cast centrifugally, and in many cases are giving better service.

Shenango-Penn castings have unusual advantages in strength and purity, and actually save production time because less machining is required on the finished product. Why not send for a copy of our new Bulletin No. 143 which describes the Shenango-Penn process and products, and gives a complete table of alloys available?

SHENANGO-PENN MOLD COMPANY

411 WEST THIRD STREET, DOVER, OHIO

Executive Offices: Pittsburgh, Pa.

Outstanding

IN ITS CAPACITY

With an ultimate capacity of 1,600,000 tons of iron ore per year, Mather Mine is now being brought into production. In increasing effort Cleveland-Cliffs ore in Cleveland-Cliffs boats serves at the command of American industry.

LAKE SUPERIOR IRON ORES
VESSEL TRANSPORTATION • • • COAL

C C C

THE CLEVELAND-CLIFFS IRON CO.

CLEVELAND • • OHIO

ROEBLING "Blue Center" helps them set the pace!

They start with a cow pasture and in a few hours have it ready for fighter planes taking off to battle . . . with the aid of "swiss cheese" steel strips woven into an all-weather emergency landing field! That's the kind of problem the Corps of Engineers thrive on.

We know, because "Blue Center" goes along on so many of their assignments . . . from tractor cranes to mobile cableways, from river dredges to motorized winches. And whether it's lifting the face of Mother Earth for the Army or passing the ammunition for war plants, you'll find Roebling "Blue Center" Steel Wire Rope on the job wherever the going is tough.

Roebling is learning every day the ways to make "Blue Center" better than ever before. Roebling development engineering, facilities and experience give it the extra stamina to meet unusual as well as routine jobs . . . to give extra service wherever extra service is called for . . . toward Victory.

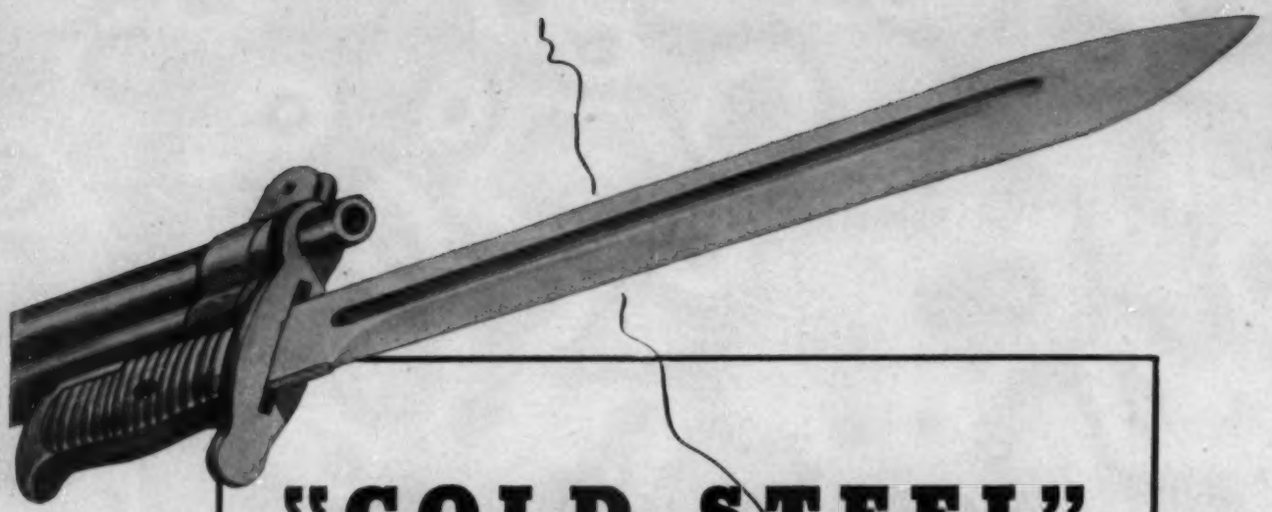
It's your wartime duty to use wire ropes EFFICIENTLY!

Whatever your big job is, you've got a small but important job to see that wire rope is properly cared for on your *equipment*. To help you, Roebling has assembled a wealth of conservation data on convenient tags that operating men can fasten right on to reels and equipment. It's a simple, handy way to remind and instruct them about such vital precautions as:

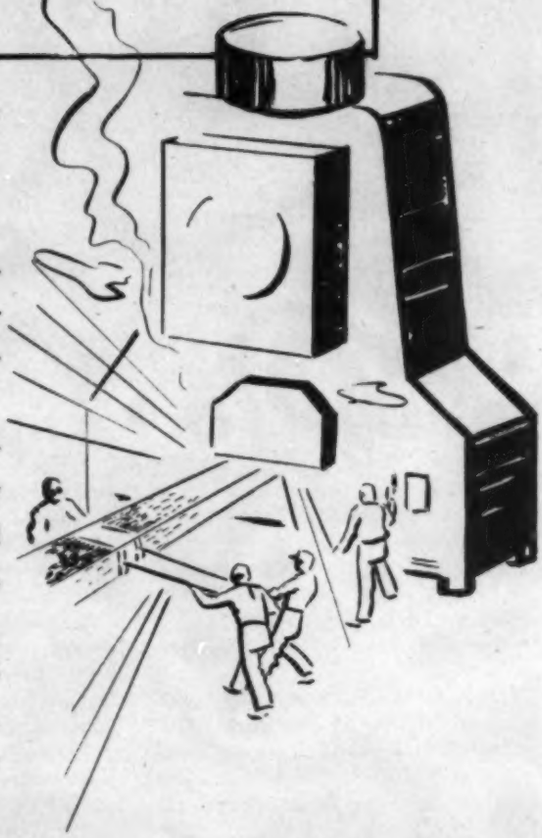
1—PROPER INSTALLATION
2—CORRECT SPOOLING
3—PROPER USE OF CLIPS
4—REGULAR LUBRICATION
5—FREQUENT INSPECTION
6—CAREFUL OPERATION

Our nearest office will gladly furnish as many copies of this tag as you need. Ask for Tag "A".

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY *Branches and Warehouses in Principal Cities*



"COLD STEEL" *has no place here!*



A forging press or a rolling mill is no place for "cold" steel. The delivering of billets uniformly heated to the right temperature calls for skillful furnace engineering and well-designed burners.

Let Bloom Engineering show you how the proper application of modern burners can produce ideal results. In many cases, greatly improved heating conditions are obtained through relatively simple alterations, and with little or no disturbance to present operations.

Furthermore, with BLOOM LONG-FLAME BURNERS you can convert INSTANTLY from gas to oil or oil to gas.

To conserve fuel, improve your heating results, reduce costs, call Bloom!

BLOOM ENGINEERING COMPANY

857 WEST NORTH AVENUE · PITTSBURGH, PA.

SIX Electroweld FEATURES TO MEET YOUR RIGID REQUIREMENTS

6
1. The modern Electroweld mills assure tubing with uniform diameter.
2. Square cuts with minimum burr.
3. Being made from flat rolled steel, it has uniform wall thickness throughout.
4. Test-proven electric resistance welds provide solid wall structure.
5. Clean, scale-free, silver-bright surface.
6. Controlled atmosphere annealing provides uniform physical properties.
1
2
3
4
5
6

Electric resistance weld tubing provides economical and dependable results for most pressure and mechanical applications. And since Electroweld Tubing is made on America's most modern electric resistance weld mills, no other make of welded tubing has greater uniformity and dependability. You can be assured of uniform wall thickness, uniform diameter, solid wall structure at the weld, uniform physical properties, and clean, scale-free silver-bright surface as well as a lathe cut with minimum burr. Best of all, Electroweld can maintain this uniform and dependable production to your specifications.

The entire facilities of the Electroweld Steel Corporation are now devoted to the war effort, however, when peace be ours, we would appreciate serving you with our high quality product.

Electroweld

Electroweld STEEL CORPORATION · OIL CITY · PENNA.

Manufacturers of pressure and mechanical steel tubing

Our production effort is on the beam! Bill and his *top flight* welders—Jim and his *first team* machinists—Tom and his *winning* forgers . . . we'll all *keep* our Army-Navy "E" *flying!*

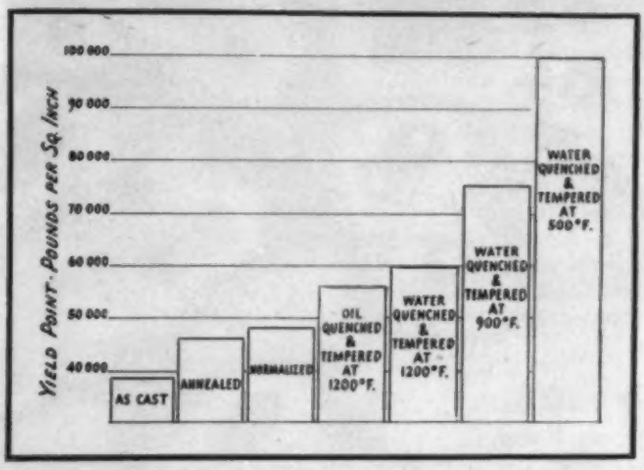
We at Struthers Wells are highly pleased that our collective skills—reflected in our regular peacetime production (Pressure Vessels, Kilns, Rotary Dryers, Mixing Equipment, Heat Exchangers, Evaporators, Crankshafts, Propeller Shafts, Heavy Forgings, Marine Auxiliary Equipment, Heating Boilers, as well as complete fabrication of Alloy and Stainless Steel Equipment)—can now be of *so great value, to so many,* in this world encompassing war.

After Victory is won, every ounce of accumulated knowledge, skill and production of Struthers Wells' large resources now hurled into vital war production, will be even better qualified and ever-alert to serve your peacetime requirements.

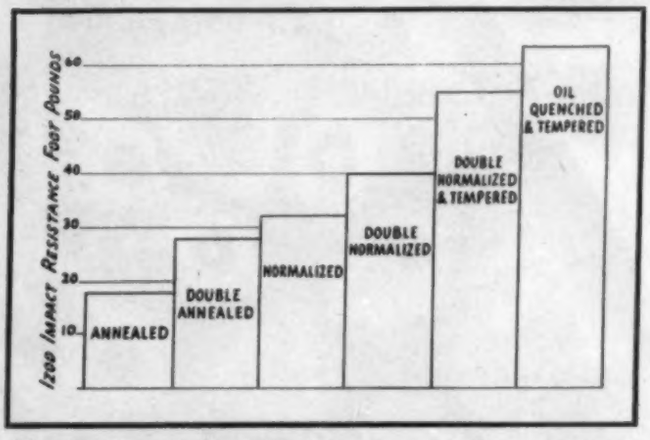
STRUTHERS WELLS CORPORATION

TITUSVILLE, PENNA. AND WARREN, PENNA.

SPECIFY THE MATERIAL THAT FULFILLS ALL OF YOUR REQUIREMENTS ...NO MATTER HOW SEVERE THE CONDITIONS



Showing how the Yield Point of carbon cast steel may be increased by heat-treating.



Showing how Impact Resistance of an alloy cast steel may be increased by heat-treating.

Cast steel is a versatile material.

If you must have great strength and toughness, or extreme rigidity, or extra hardness, or resistance to wear, temperature, stresses, or fatigue, you can write your own ticket.

Cast alloy steels are produced with all of these characteristics, in any combination, and their desirable mechanical properties are readily enhanced by heat-treating.

Special alloys may be specified in limited quantities without the delay or extra cost of small mill runs—an important factor in war production.

Complicated shapes may be had in close to final form, yielding big savings in machining, finishing and assembly.

The charts on the left indicate the wide range of properties that may be obtained by heat-treating typical commercial cast steels.

This new booklet gives information on the mechanical properties of cast steel compared with other cast ferrous metals.

Address the Steel Founders' Society, 920 Midland Bldg., Cleveland, Ohio. Enclose 10c postage.

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

WHEN THE LAST SHOT IS FIRED...

WHEN the smoke of destruction has cleared, and America returns to peace, what of victory will be ours? What will be left?

Here is one thing: A greater production plant than men even dreamed possible, and the war-learned efficiency to handle that plant under the most drastic circumstances of change-over and production.

Here is another: New techniques, new skills, new and better and cheaper materials, and more abundant sources of supply than ever before, with a new price structure based upon *full* production by small plants as well as large.

And here is another thing that will be left, when this war is finally over: One of the greatest consumer markets this country has ever seen, with billions in savings from war bonds and restricted buying, needing millions of automobiles, appliances, homes, and the countless new products that will appear.

For the last gun to be fired in this war will be the starting gun of the greatest era of peacetime advancement this world has ever known.

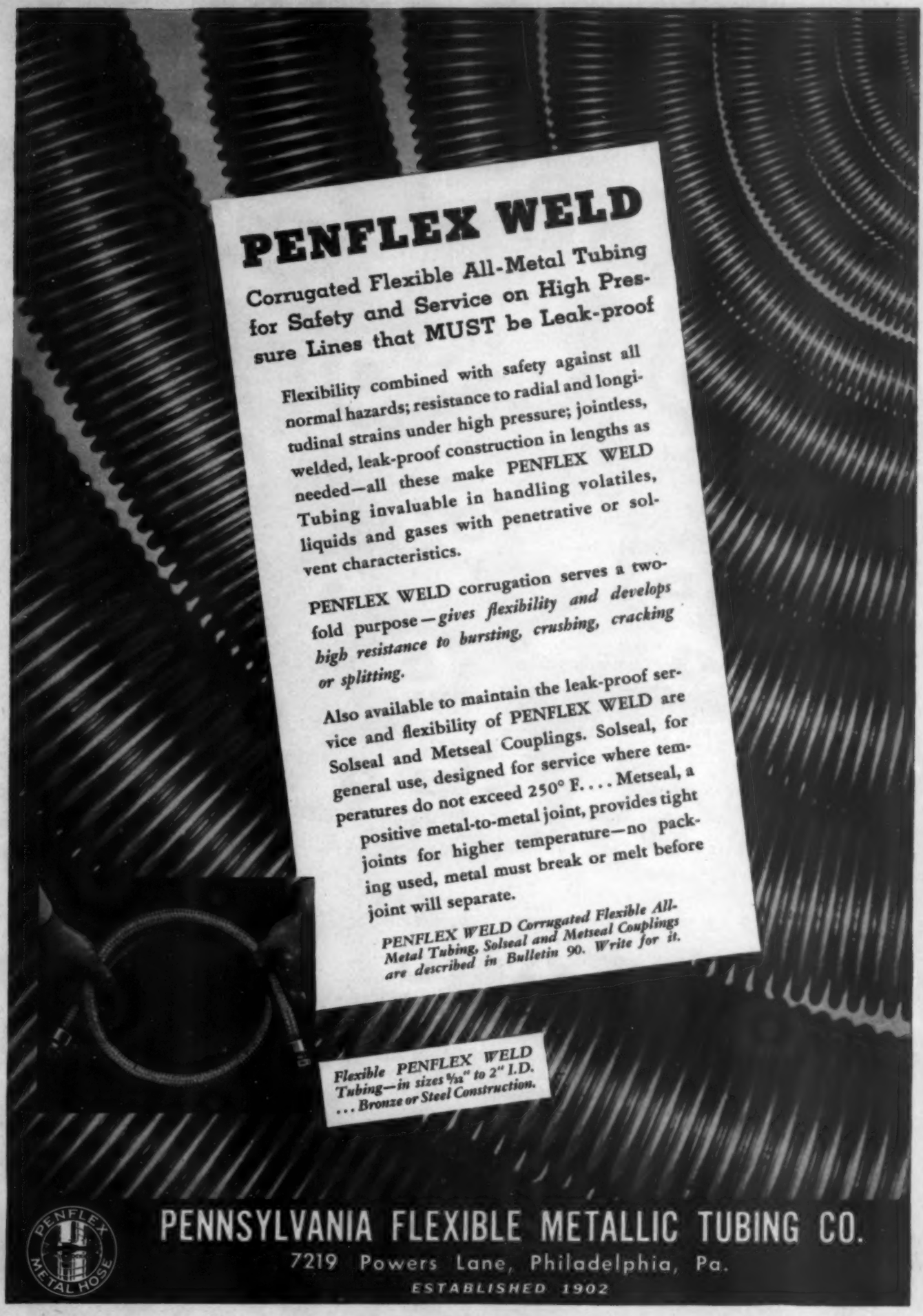
If you are to share in the future of the new world, after this war is over — if you are to successfully compete for the new peacetime markets of America — the time to start production planning is *now* . . . and in this we can help you:

Write to Bryant! Send us your internal grinding problems, and take advantage of the work that our engineers can do *now* to convert your plant and its tools to the profitable job that lies ahead!

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U.S.A.

SEND FOR THE MAN FROM BRYANT


PENFLEX WELD
Corrugated Flexible All-Metal Tubing for Safety and Service on High Pressure Lines that MUST be Leak-proof
Flexibility combined with safety against all normal hazards; resistance to radial and longitudinal strains under high pressure; jointless, welded, leak-proof construction in lengths as needed—all these make PENFLEX WELD Tubing invaluable in handling volatiles, liquids and gases with penetrative or solvent characteristics.
PENFLEX WELD corrugation serves a two-fold purpose—gives flexibility and develops high resistance to bursting, crushing, cracking or splitting.
Also available to maintain the leak-proof service and flexibility of PENFLEX WELD are Solseal and Metseal Couplings. Solseal, for general use, designed for service where temperatures do not exceed 250° F. . . . Metseal, a positive metal-to-metal joint, provides tight joints for higher temperature—no packing used, metal must break or melt before joint will separate.
PENFLEX WELD Corrugated Flexible All-Metal Tubing, Solseal and Metseal Couplings are described in Bulletin 90. Write for it.
Flexible PENFLEX WELD Tubing—in sizes 9/32" to 2" I.D. . . . Bronze or Steel Construction.
PENFLEX METAL HOSE
PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.
7219 Powers Lane, Philadelphia, Pa.
ESTABLISHED 1902

McKAY ELECTRODES SPEED PRODUCTION IN EVERY WAR INDUSTRY

War and *necessity* are one . . . and necessity is the "mother of invention."

When war demanded new conceptions of production, *revolutionary applications of welding* were "invented" to meet the need.

In no small measure McKAY Shielded-Arc Electrodes contribute to the total accomplishment.

For it is only natural that a manufacturing policy, which merited the title "the researched line," should likewise rise to meet the requirements of this emergency. Thus new analyses, new coatings, new sizes, new ranges of adaptability . . . plus ever growing volume . . . have caused McKAY Electrodes to help speed production in every type of war industry.

THE McKAY COMPANY · PITTSBURGH, PA.

PACIFIC COAST SALES OFFICES: 125 S. Santa Fe Ave., Los Angeles · 100 Howard St., San Francisco

The McKay line includes regular carbon steel, stainless, and alloy steel electrodes for every welding purpose. Literature on request.

Among the first honored with the Navy "E", The McKay Company is proud of the broader award of the Army-Navy "E".

McKAY WELDING ELECTRODES

AND INDUSTRIAL, MARINE AND AUTOMOTIVE CHAINS

"KEEP ON BUYING U. S. WAR BONDS"

LOOKING *into the Future* NOW

If the history of metals in this war is ever written in full, the contribution of laboratory technicians will be revealed.

Most of the alloys now in use were first melted in a small AJAX-NORTHRUP furnace. The fast melts, perfect control, ability to vary or duplicate and the comfortable working conditions are known to most of the university and industrial metallurgical laboratories in the country.

But as these men now work to solve war problems they get glimpses of the future too. The tremendous increase in the use of high frequency for testing, pilot plants, large scale melting, heating and brazing, are like handwriting on the wall.

They see the vision of duplicating laboratory discoveries in future quantity peace time production with a certainty as to results, timing and cost.

Only a few of the smaller AJAX-NORTHRUP furnaces are shown on this page.

AJAX furnaces range from 1 oz. to 8 tons and from 60 to 1,000,000 cycles. Oscillators, tube converters, and motor generators provide the power. AJAX also provides the experience that has successfully solved hundreds of unusual problems from brazing fuse-seat liners to hardening razor blades or melting special alloys at the rate of 44 tons in 24 hours.

Catalogs on heating, melting, or laboratory units will be sent on request.

3 to 6 Kw.
Converter with 3P4 Furnace and Truck

20 to 40 Kw.
Converter with 17 pound Furnace

15 to 60 Kw.
Tube Converter

AJAX HIGH FREQUENCY FURNACES

NORTHRUP AJAX ELECTROTHERMIC CORPORATION, AJAX PARK, TRENTON, N.J.

ASSOCIATE COMPANIES: THE AJAX METAL CO. *Non-Ferrous Ingot Metal for foundry use.*
AJAX ELECTRIC FURNACE CORPORATION, *Ajax-Wyatt Induction Furnaces for melting.*
AJAX ELECTRIC CO., Inc. *Ajax-Hultgren Salt Bath Furnace and Resistance Type Electric Furnaces.*

WARTIME, PEACETIME—KEEP 'EM CUTTING *The Wells Way!*

WELLS No. 8

Wells SAWS
THE SIGN OF SERVICE

THE SAW WITH THOUSANDS OF FRIENDS IN INDUSTRY!

A fast and accurate metal cut-off saw able to handle most all types of metals in various shapes and forms as applied to industry. It wanted a versatile, simple unit for odd jobs or production work. The Wells No. 8 was the answer — and that is why so many plants, large and small, have Wells Saws.

Today's war production program and tomorrow's peace-time competition will emphasize the advantages Wells Engineers have built into their products. If you have metal cutting problems look for the answer in a Wells. Call your distributor or write direct.

Wells Has Established Leadership

SPECIFICATIONS

WELLS No. 8

Capacity: Rectangle.....8" x 16"
(spec. bowed guides)... 5" x 24"
Rounds.....8" dia.
Speeds: ft. per min. 60, 90, 130
Motor.....Specifications optional

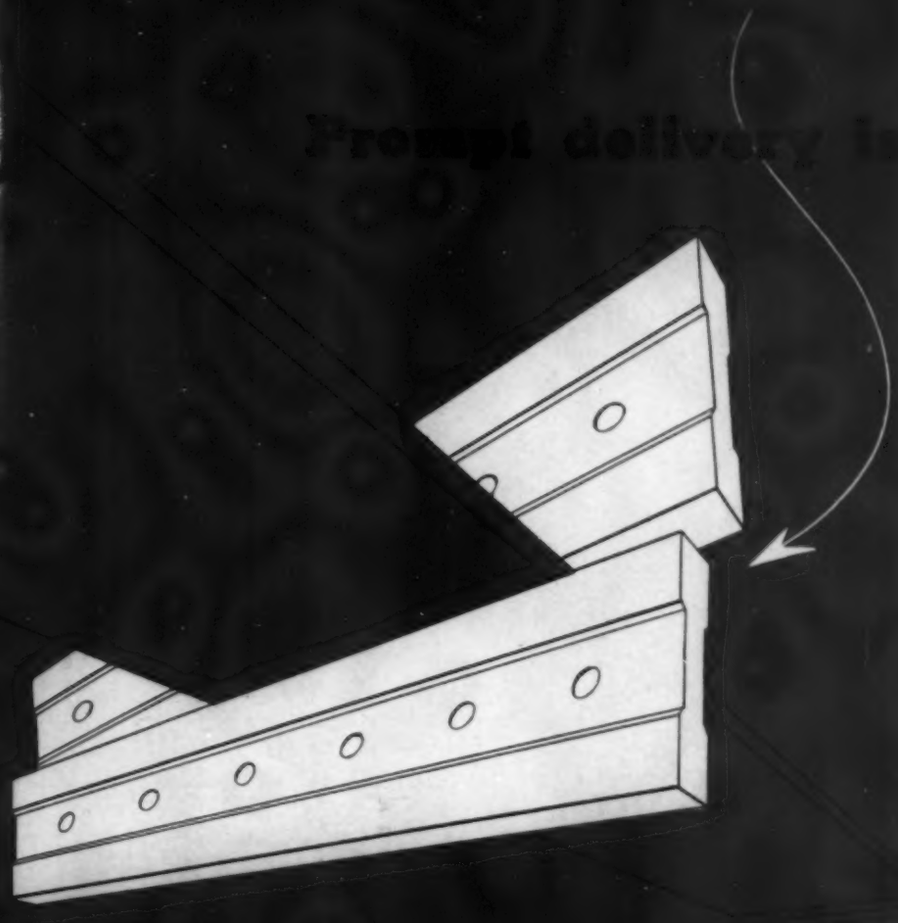
WELLS No. 5

Capacity: Rectangle... 5" x 10"
(spec bowed guides)
Rounds.....5" dia.
Speeds: ft. per min. 60, 90, 130
Motor: .... Specifications optional

WELLS MANUFACTURING CORPORATION

Wells METAL CUTTING BAND SAWS

1515 FILLMORE STREET • THREE RIVERS, MICHIGAN



Prompt delivery is vital

When you need Shear Knives

for a war job

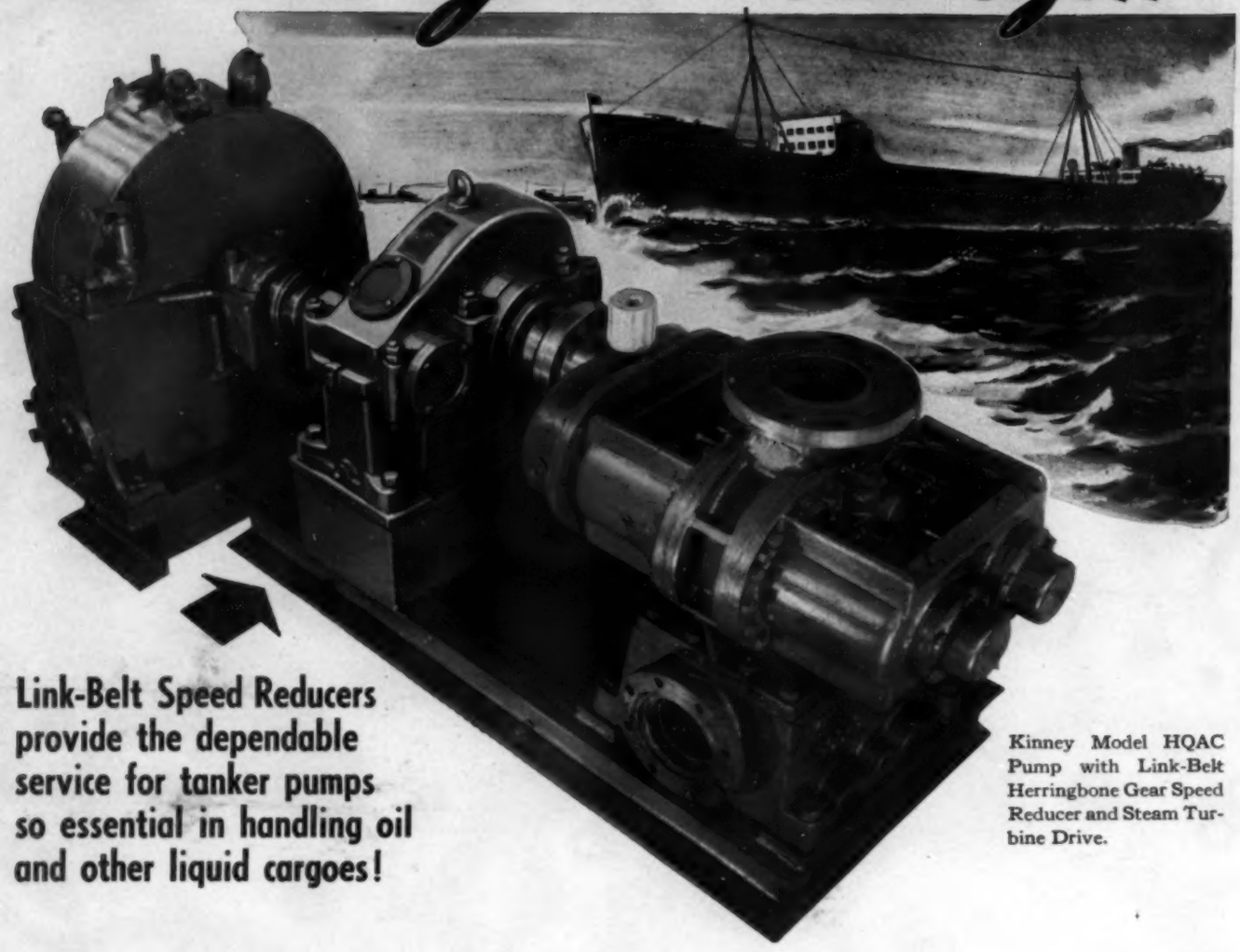
Because we make our own E.I.S. alloy steel and have greatly expanded facilities, you can be sure of prompt delivery at a lower rating when you specify Heppenstall Shear Knives. You can be sure of precise manufacture, too . . . their production is controlled by advanced methods, modern equipment, and the skill of many years of experience. *Order Heppenstall Knives, and when you do let us know the shearing job for which they are intended. Let our engineers help specify the proper knife. It's usually false economy to use a knife to cut a thickness or a steel for which it was not designed.*

Heppenstall

PITTSBURGH • DETROIT • BRIDGEPORT
EDDYSTONE

Forging Fine Steels for Fifty-Three Years

The Oil Goes Through!



Link-Belt Speed Reducers provide the dependable service for tanker pumps so essential in handling oil and other liquid cargoes!

Kinney Model HQAC Pump with Link-Belt Herringbone Gear Speed Reducer and Steam Turbine Drive.

Tankers and oil-fueled ships, a most important part of our shipping today, depend heavily on their pumping equipment. Important to pumping efficiency are positive drives such as the Link-Belt herringbone reducer, as used on Kinney Manufacturing Co.'s model HQAC pump, shown here, driven by a Whiton turbine. How important this pump builder considers the speed reducer can be told in their own words: "Independent herringbone speed reducers have important advantages, as they offer a wider selection of speeds and horsepowers; are manufactured by specialists in gear design and construction; and since they are independent both reducer and pump are more easily accessible for inspection and repair. In general, sound engineering suggests purchase of speed reducer with pump for compact mounting."

Link-Belt herringbone gear speed reducers with anti-friction bearings, pinions integral with shafts, continuous herringbone gears totally enclosed in rigid housings, are especially suited for heavy duty shock load and where single, double or triple reduction is required in limited space.

9008-A

LINK-BELT COMPANY

Indianapolis, Chicago, Philadelphia, Atlanta, Dallas, San Francisco, Pittsburgh, Cleveland, Detroit, Toronto
Offices, Warehouses and Distributors in Principal Cities

LINK-BELT SPEED REDUCERS

The overhead Tramrail system plays an important part in the final assembly of Seagrave pumpers and ladder trucks.

Parts are fed to this assembly line and the completed 12-cylinder motors are hauled away by the overhead Tramrail route. The hoist is two tons capacity.

THE SEAGRAVE CORPORATION SPEEDS FIRE ENGINE PRODUCTION with Cleveland Tramrail

In the 60 years that have ensued since The Seagrave Corporation, Columbus, Ohio, first began making horse-drawn fire-fighting equipment, hundreds of improvements have been made and many radical changes brought about. In appearance, in performance, in fire-fighting capability, there is no resemblance between their present modern apparatus and that of the early days.

Likewise have their manufacturing methods been changed to keep up with the times. Their shops are equipped with the finest tools to do exacting work quickly. Cleveland Tramrail is provided throughout the plant to speed materials handling, make heavy lifts, facilitate assembling, fitting and setting-up.

Materials handling methods like fire engines have also gone through a great development period, and this development is still continuing at a rapid pace. Cleveland Tramrail is continually working on new methods and advancing ideas for handling materials faster, safer, easier and at lower cost.

GET THIS BOOK!

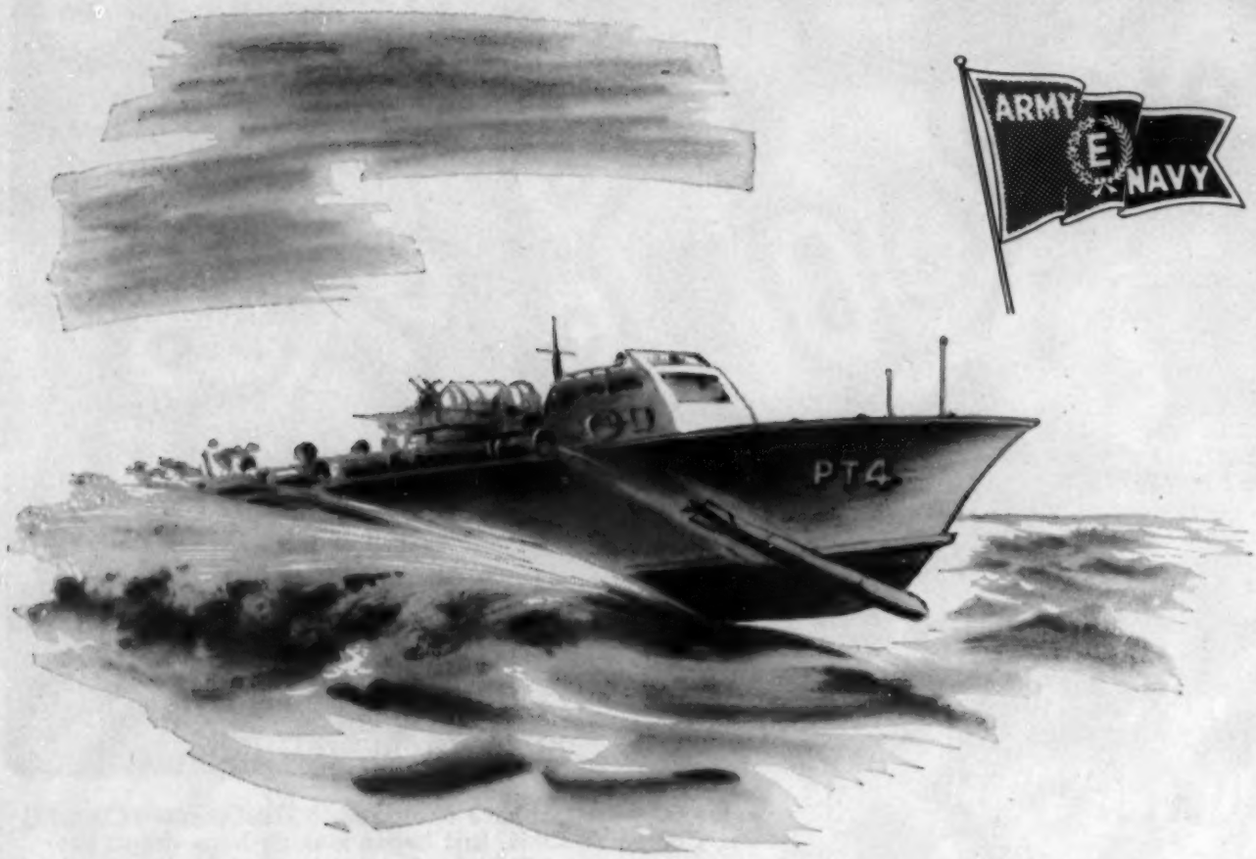
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 EAST 283rd ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

Hell-bent-for-election



THESE flying water-scats were designed almost beyond the power of men to control. As it is, the men must be heavily padded, lashed to their positions, to take the pounding of terrific speeds in rough weather.

Every part of these mosquito boats from gun to galley has been specified and manufactured to withstand the hard use that make the boats a powerful weapon of attack.

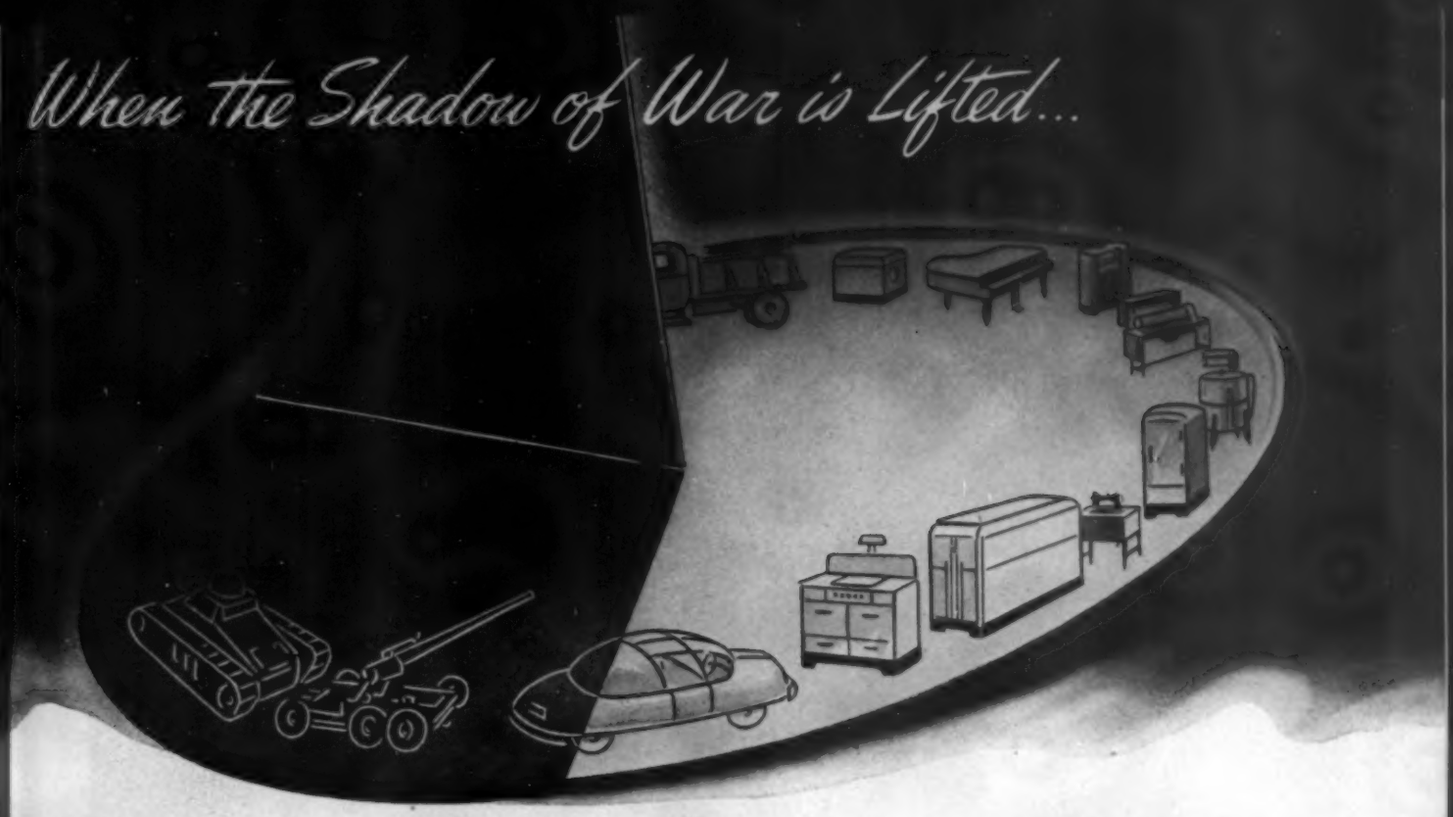
For rugged service in the heavy duty machines of war—and for delicate duty in the sensitive instruments of science go Barnes-made springs in endless streams from mass production lines, controlled by the engineering skill of veteran springmakers.

Wallace Barnes Company

DIVISION OF ASSOCIATED SPRING CORPORATION

BRISTOL, CONNECTICUT, U. S. A.

Barnes-made Springs *for Victory*

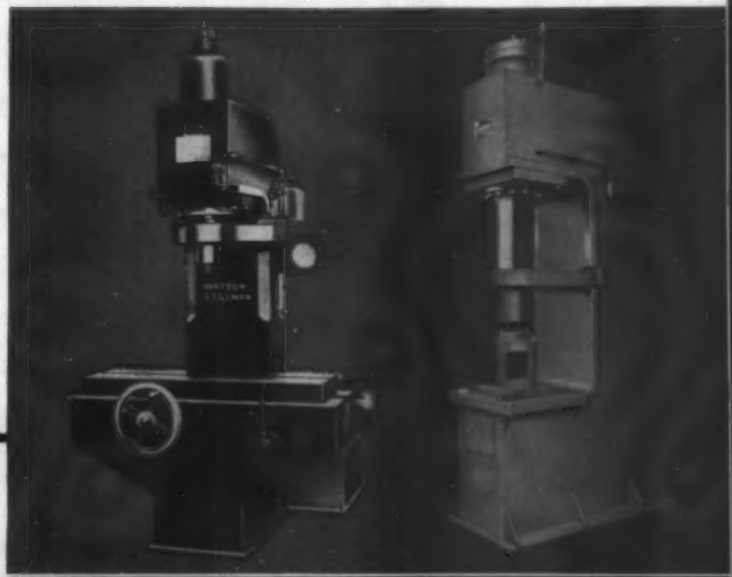


War Busy Presses will do
NEW JOBS HYDRAULICALLY

Some day victory will bring the "cease-firing" order. But it needn't mean "cease-producing" for industries now doing war jobs hydraulically with Watson-Stillman presses. These machines will be adaptable to post-war metal-working operations, and in effecting a rapid, efficient change-over, W-S engineers will be available for special advice.

Their services will put at your disposal hydraulic experience which dates from the eighteen forties. Their suggestions will draw on original research now being carried on. These Watson-Stillman research activities are being expanded in enlarged facilities already under construction.

Watson-Stillman has the modern automatic machinery and the engineering personnel to give practical assistance in planning to meet future requirements. In the post-victory years, the pooled experience of its entire organization can help industry to anticipate its needs correctly. It is not too early now to consult a W-S engineer. The Watson-Stillman Co., Roselle, New Jersey.



To lift war's shadow more quickly Buy

U.S. WAR BONDS

WATSON-STILLMAN

Engineers and Manufacturers of Hydraulic Machinery and Equipment— Hydraulic Presses, Pumps and Jacks, Forged Steel Valves and Fittings

SAVED BY 1/10 OF A HAIR'S BREADTH!

But for a vital replacement part accurately machined, this fighter plane in the South Pacific might be grounded—useless in defending against enemy attacks.

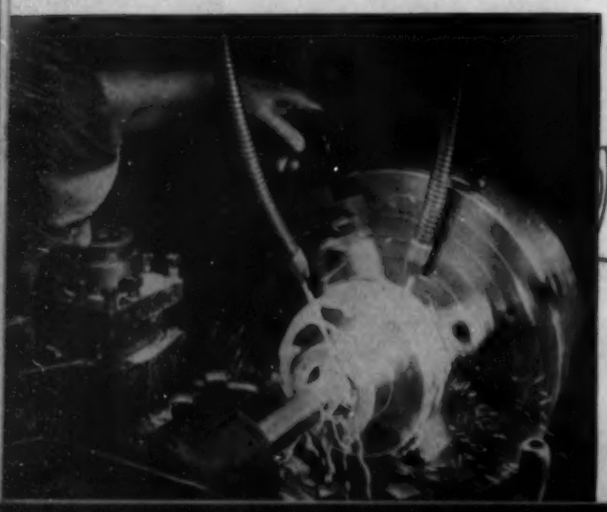
Here is where precision counts! Mass production, with interchangeable parts turned to extremely close limits of accuracy, insures quick replacement and efficient performance.

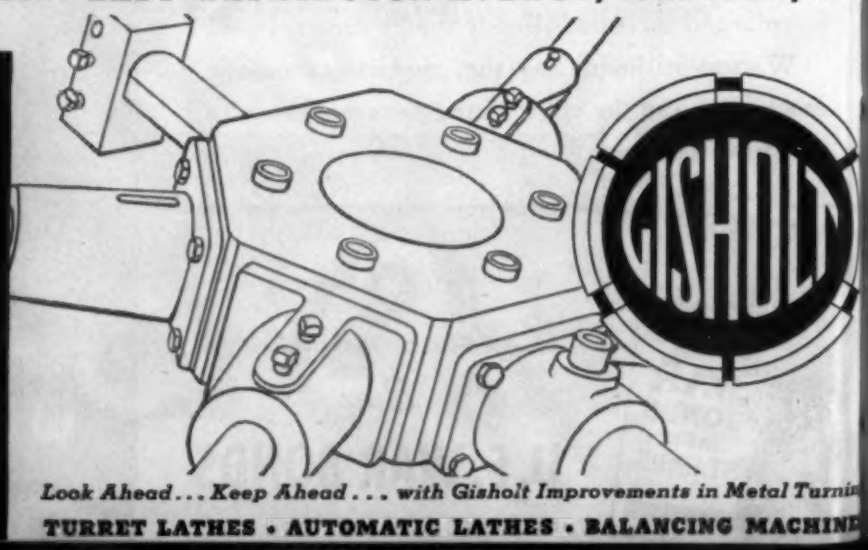
This is the kind of work which Gisholt Turret Lathes are doing every day—in thousands of machine shops throughout the United Nations—to help supply Allied forces with the equipment they need . . .

And to keep it running!

The Army-Navy "E" and the Tr
ury Flag fly side by side at Gish

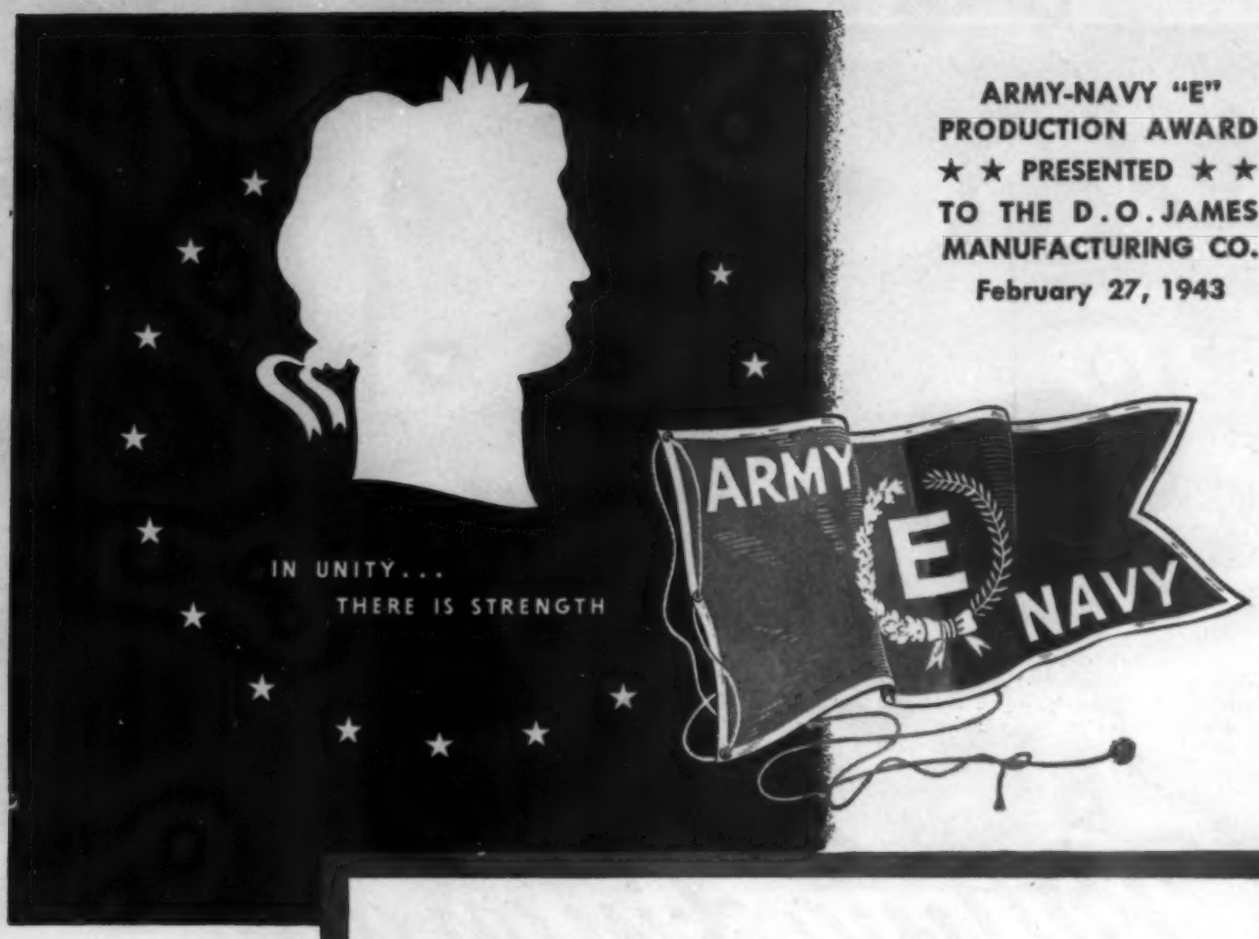
GISHOLT MACHINE COMPANY, 1217 EAST WASHINGTON AVENUE, MADISON, WI





Look Ahead . . . Keep Ahead . . . with Gisholt Improvements in Metal Turnin

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINE



ARMY-NAVY "E"
PRODUCTION AWARD
★ ★ PRESENTED ★ ★
TO THE D.O. JAMES
MANUFACTURING CO.
February 27, 1943

IN APPRECIATION . . . It is very gratifying to publicly acknowledge our appreciation of receiving the Army-Navy "E" Production Award . . . this ensign and lapel insignia is a testimonial to the mutuality of the cooperation with . . . and the understanding of . . . our employees and management. This cooperative understanding has been productive of successful attainments that have resulted in a schedule maintenance and a quality to our products that make us proud in knowing that after 55 years of making all types of gears and gear reducers that we have again been given the opportunity of serving our country. Lastly . . . may we express extreme appreciation of the combined efforts of our employees, our suppliers, our executive control and management . . . and we solemnly pledge to do all possible to maintain and perpetuate this record of successful achievement during and after this emergency.

POWER SAVING PRODUCTS

Planetary Spur Gear, Medium and Heavy Duty Worm Gear, Generated Continuous-Tooth Herringbone Gear and Motorized Speed Reducers, in types to drive up, down, horizontally or at an angle, Cut Spur, Straight and Spiral Bevel, Mitre, Spiral, Worm, Internal, Helical and Herringbone Gears in all sizes and of all materials, Sprocket Wheels, Racks, Flexible and Universal Couplings.

D.O. James MANUFACTURING CO.

ESTABLISHED 1888

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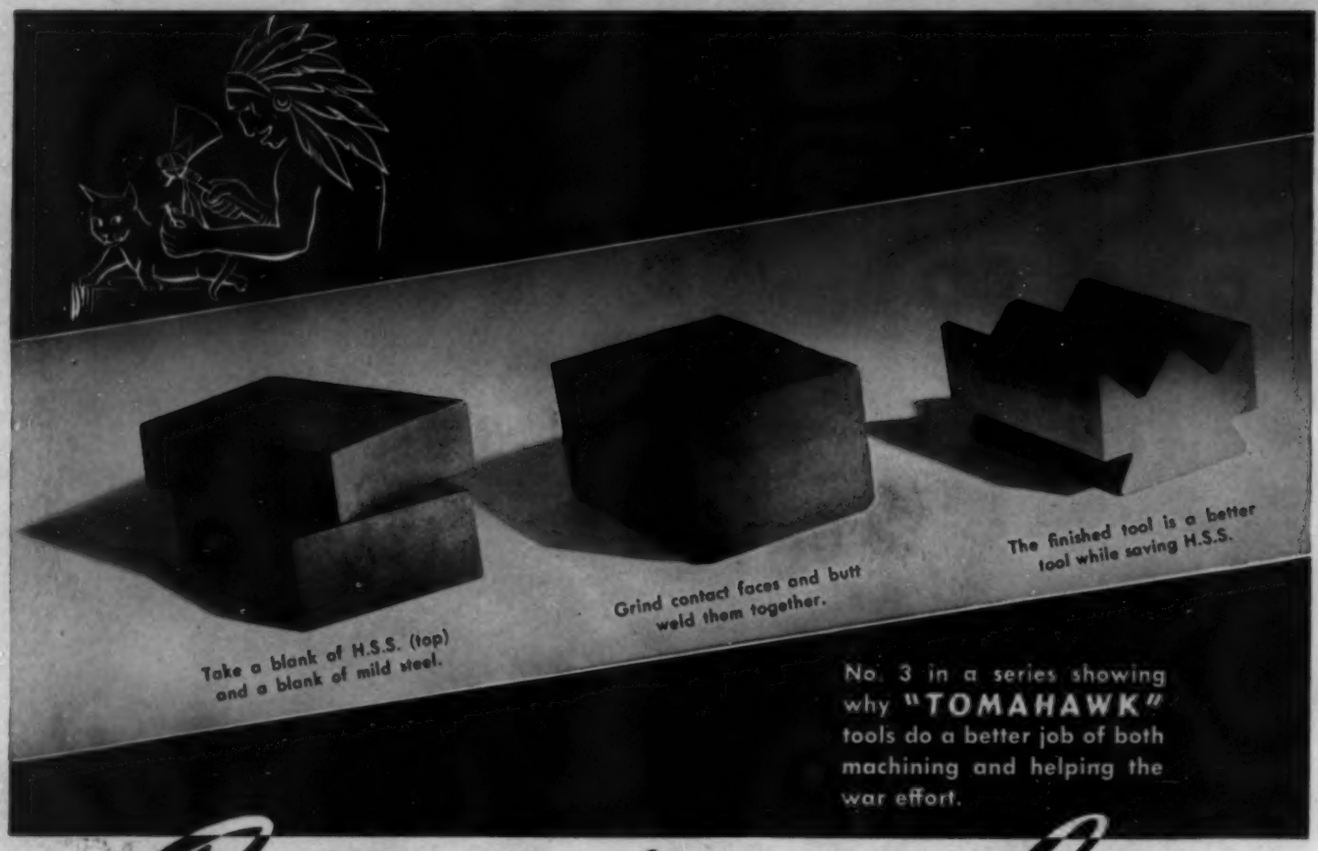

Take a blank of H.S.S. (top) and a blank of mild steel.
Grind contact faces and butt weld them together.
The finished tool is a better tool while saving H.S.S.
No. 3 in a series showing why "TOMAHAWK" tools do a better job of both machining and helping the war effort.

Putting skin on a Cat .....or on a Tool.....

Just as there is more than one way to skin a cat, so there is more than one way to save critical tungsten and still make better tools.

There is a total of less than 2 per cent of critical tungsten in the complete **TOMAHAWK** tool type* shown at the right. The reason: it has been fabricated by electrically welding High Speed Steel to mild steel, prior to machining, heat-treating, and grinding. The net saving of tungsten usually runs 50 to 75% as compared with tools of solid H. S. S.

The **TOMAHAWK** tool shown is 'hard' where hardness is required (at the cutting edges), and is 'tough' where toughness is important (at the dovetail).

Perfection of welding and heat-treating techniques have been carried to such a point today that failures of such tools at the weld are virtually unknown. Thousands of electrically welded composite steel **TOMAHAWK** tools are now in use in war production industries.

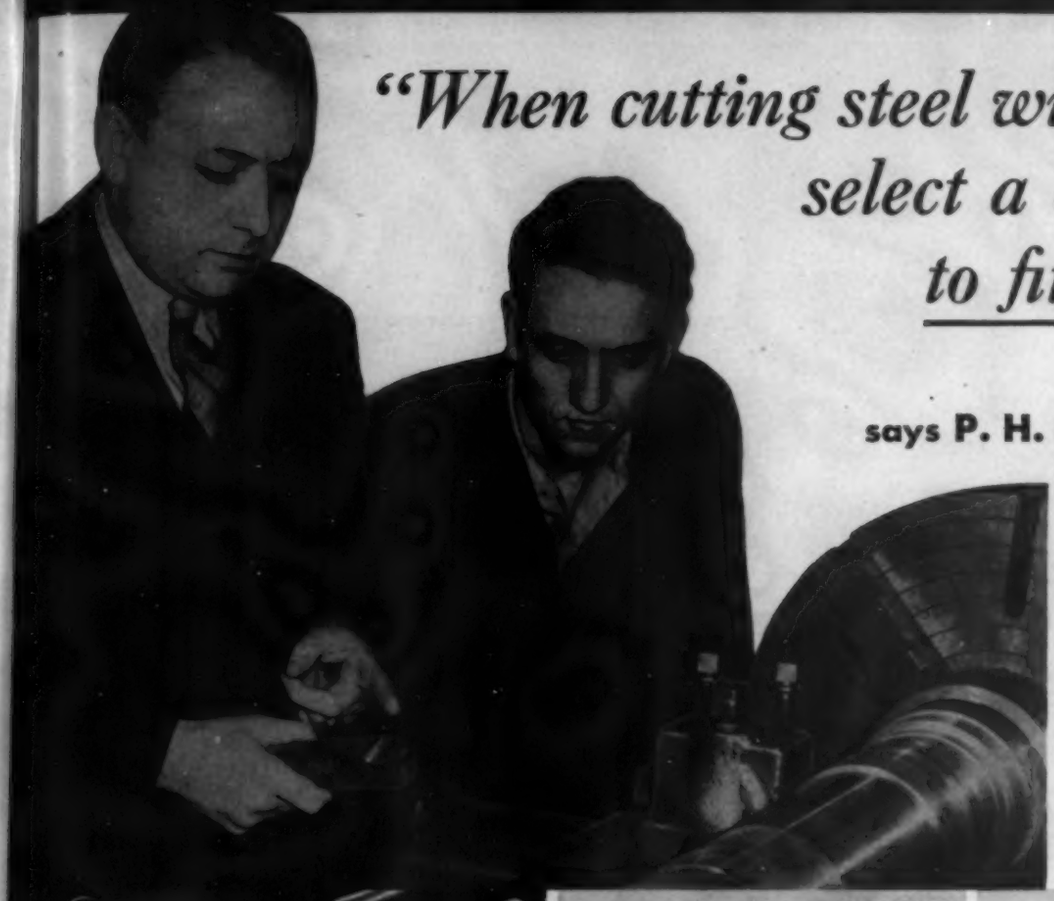
**Genesee produces a complete line of cutting tools, including H.S.S., carbides, etc. Send for "streamlined" catalog No. GT-42-S*

GENESEE TOOL COMPANY

FENTON, MICHIGAN

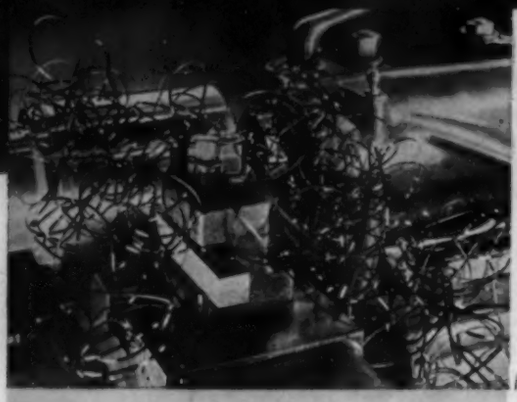
* Registered Trade Mark

"When cutting steel with carbides... select a chip breaker to fit the job!"

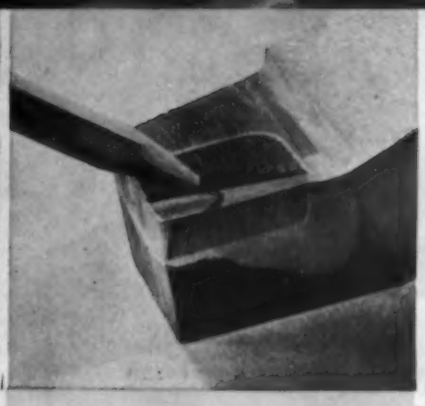


says P. H. MILLER, Chief Engineer
Carboloy Company, Inc.
Detroit, Michigan

BECAUSE OF its high tensile strength, steel normally produces a continuous chip during machining operations. These chips are awkward to handle even at the slower cutting speeds of high-speed steel tools and present a real problem in safe economical disposal at the high speeds common with cemented carbide tools. To get maximum results, chips must be controlled by the use of a suitable chip breaker.



"THERE'S NO TIME for making 'hay' on steel cutting jobs today! Chips like these are a hazard to the operator, slow down production and often mar the finish of the work. They are easy to eliminate with the right type of chip breaker."

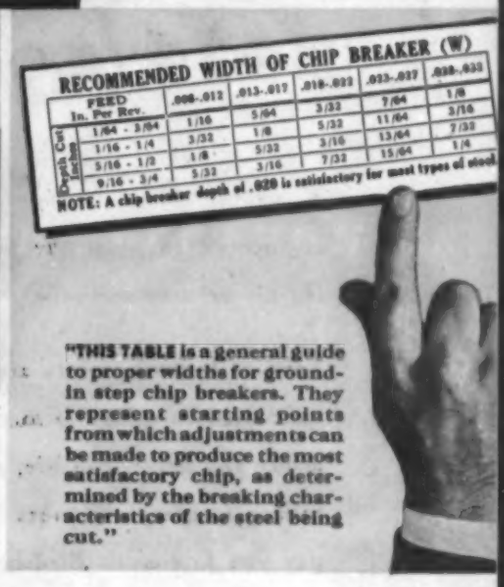


"THE GROUND-IN STEP CHIP BREAKER is the most widely used type. Recommended for practically all steel cutting jobs, this chip breaker can be adjusted to meet individual conditions, in most cases, simply by varying the width."

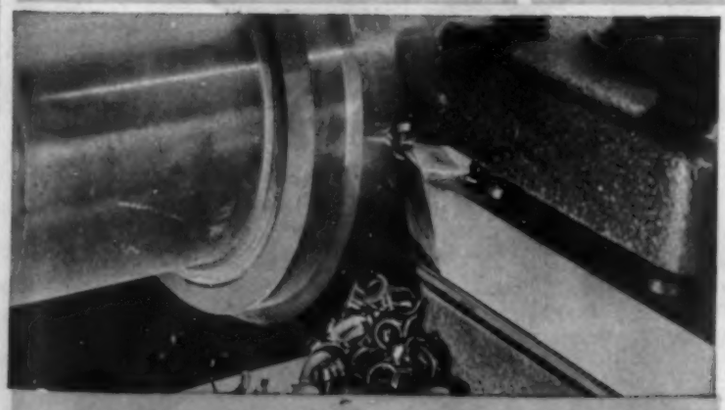
RECOMMENDED WIDTH OF CHIP BREAKER (W)

Depth Of Cut Inches	FEED In. Per Rev.	.008-.012	.013-.017	.018-.022	.023-.027	.028-.033
	1/64 - 3/64	1/16	5/64	3/32	7/64	1/8
	1/16 - 1/4	3/32	1/8	5/32	11/64	3/16
	5/16 - 1/2	1/8	5/32	3/16	13/64	7/32
	9/16 - 3/4	5/32	3/16	7/32	15/64	1/4

NOTE: A chip breaker depth of .020 is satisfactory for most types of steel.



"THIS TABLE is a general guide to proper widths for ground-in step chip breakers. They represent starting points from which adjustments can be made to produce the most satisfactory chip, as determined by the breaking characteristics of the steel being cut."



"AS THE ABOVE PHOTOGRAPH SHOWS, when the chip breaker is right, you get a chip easy to handle and easy on the tool. There are no dangerous spirals of steel 'hay' to injure the operator. When the chip breaker selected fits the job, chips peel off work uniformly and safely."

The selection of a proper cutting oil is as important as the selection of the right chip breaker. That's why Shell has developed a control technique that "balances" the oil to the machine, the application and the tool. Call in the Shell man now for details.

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On many fronts our air-borne invaders are striking terror in the hearts of our enemies. For war today is three-dimensional, and mountains, deserts, seas and fortifications offer no obstacles to U. S. Paratroops.

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To make Paratroopers' fighting arms, ammunition and supplies instantly, colored parachutes are used. Pictured here are men and equipment descending upon a foreign airfield.

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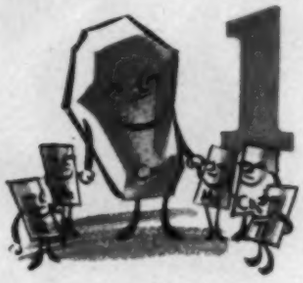
Better Power Transmission Through Better Gears

Basic Facts about
STAINLESS STEELS

A STAINLESS STEEL PRIMER



STAINLESS STEELS

are corrosion-resistant steels containing at least 12 per cent chromium with or without other alloying elements, such as nickel, manganese, molybdenum, columbium or titanium. They are supplied in a wide range of analyses.

The stainless steels vary in corrosion resistance, workability, wear resistance, and physical properties according to the amount of chromium, carbon and other modifying elements present.

VALUABLE PROPERTIES INCLUDE:

Good corrosion and oxidation resistance . . . varying almost in direct proportion to the amount of chromium present.

High strength-weight ratio in some cold-rolled types permitting fabrication of strong, light-weight trains, aircraft, and other structures.

MAINTENANCE

of stainless steels is simple. Washing with soap, water, and a cleanser recommended for stainless steel will keep the surface bright and free from surface deposits.

P-13068-2

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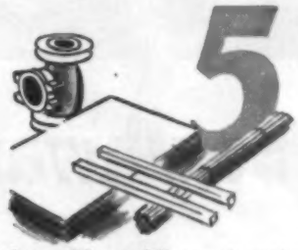
FABRICATION

is accomplished by almost all common methods. They can be machined, spun, deep-drawn, forged, punched, stamped, and otherwise mechanically-worked. They can be welded by all the common welding methods. If the austenitic steels are stabilized with columbium or titanium, and columbium-bearing welding rod is used, no annealing is necessary after welding.



MANY FORMS

are available in the common analyses including sheet, plate, strip, tubing — both seamless and welded — bars, wire, cable, welding rod, and a variety of cold-rolled shapes. Stainless steel is also supplied as foundry castings.

APPLICATIONS

of stainless steel are numerous. Because of their resistance to corrosion and oxidation, as well as their high strength and bright surface, stainless steels have been used in hospitals, chemical plants, oil refineries, railroad trains, aviation equipment, and power plants. In the present emergency, they are available only for those industries participating in war production.

• • •

Although we do not make steel, we have for more than 35 years produced "Electromet" ferro-alloys and metals used in making steel. With the knowledge accumulated from this experience, we are in a position to give impartial advice. If you have a specific problem concerning the manufacture, fabrication, or use of stainless or other alloy steels, consult us without obligation.

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Southwark builds a complete line of shipbuilding machinery including bending rolls, plate planers, keel benders, sectional flanging presses and joggling presses. New designs in these hydraulic presses and power tools are helping shipbuilders do a better job faster. Write for Bulletin K-160 which illustrates many of these products.

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Division THE BALDWIN LOCOMOTIVE WORKS, *Philadelphia, Pa.*

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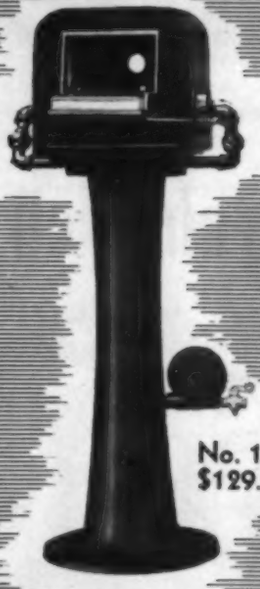

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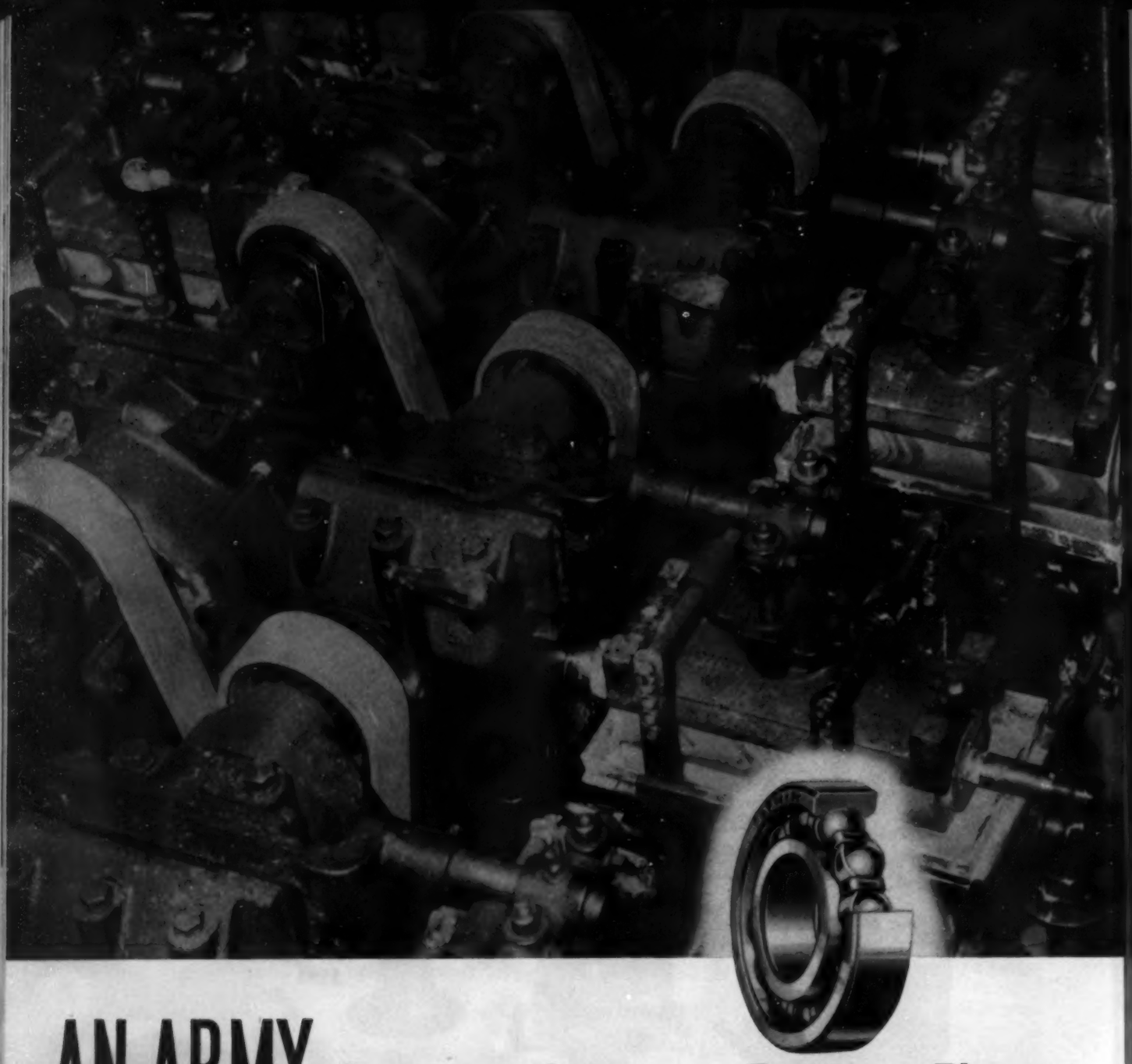


AN ARMY that marches on a Factory Floor

Imagine! . . . you surely can . . . the prodigious number of industry's "marching" machines. These machines never hear such a command as, "at ease"! They keep up the same relentless pace through one shift and the next . . . 24 hours every day. They keep our pilots in the air. They keep our tanks rolling. They keep our fighting men on the go, with blazing guns. Their steady whirring, humming, clicking, pounding is the Victory song of the nation!

The Fafnirs working here . . . 7 of them in each gearbox, 28 more on the shafting of this 100-foot machine . . . are built to *stay on the job* under tough, abrasive conditions. Like the millions of Fafnirs serving with the fighting forces, and the millions in other industrial machines here at home . . . these Fafnirs are "taking it". Their service records can already be stamped, "far beyond the call of normal duty"! The Fafnir Bearing Company, New Britain, Connecticut.

FAFNIR

BALL BEARINGS

THE BALANCED LINE - FOR ORDNANCE, AIRCRAFT AND INDUSTRIAL MACHINERY

This Year Rubber Is Tapped from Test Tubes

Synthetic Rubber Already Is Working for Users of Mechanical Rubber Goods

War production is up threefold. But the vital rubber stock pile is dwindling fast. This is the year of crisis in rubber.

There is only one solution . . . the production of synthetic rubber in steadily increasing tonnages . . . synthetic rubber to take over jobs once handled by natural rubber . . . to perform new tasks, serve in new applications created by wartime need.

One of the first synthetic rubber plants in the Government's program was built and is being operated by United States Rubber Company . . . another soon will be in production.

Our engineers have been working with synthetic rubber since 1921. During this period they have learned that no one synthetic should be used for all types of mechanical rubber goods. They have found where and how synthetic is superior to natural rubber, where it is equally as good, where it falls short. They know what uses each of the five basic commercial types of synthetic rubber is best suited for — Neoprene, Buna-S, Buna-N, Butyl, or Thiokol—and how to compound the specific synthetic rubber for the specific task. U. S. Rubber has used all five types and knows which one to select for the performance required.

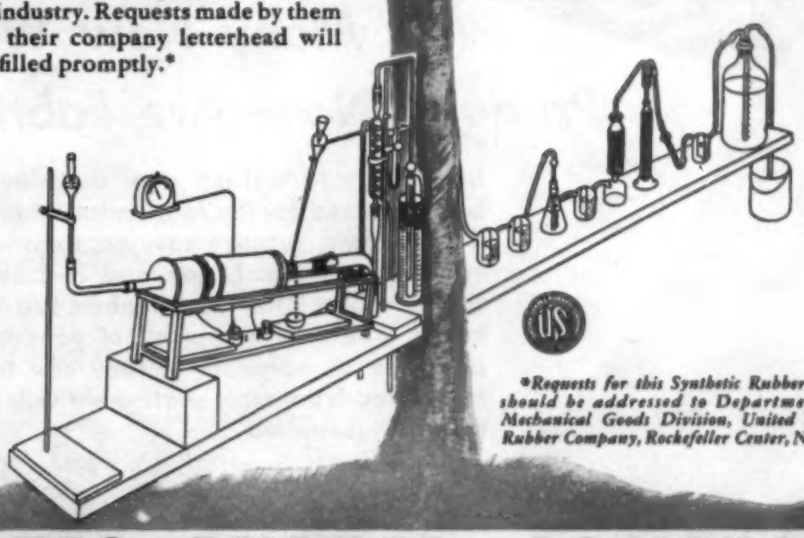
Information based on the results of vast experiments and practical applications of synthetic rubber has been incorporated in a new comprehensive book, *The Five Commercial Types of Synthetic Rubber.*

This informative book traces the history of synthetic rubber from the earliest experiments of Michael Faraday to the present. It discusses each of the basic types of synthetic rubber, tells where it has been used successfully in United States Rubber Company products, and compares its properties with natural rubber. It tells how synthetic rubber is made. It is a detailed answer to the most vital question of the day.

We feel that *The Five Commercial Types of Synthetic Rubber* is a publication of real importance to men of industry. Requests made by them on their company letterhead will be filled promptly.*

The successful use of synthetic rubber in mechanical rubber goods and the insurance of fully dependable service depend largely upon the skill of the manufacturer and compounder. Each of the five basic commercial types of synthetic permits a myriad of variations.

The United States Rubber Company has been developing and improving rubber products for one hundred years. Today, the same vast resources for research and development that resulted in some of the most spectacular achievements in the rubber industry are being devoted to the problem of synthetic rubber. A great backlog of knowledge already has been built. More is being constantly added.



**Requests for this Synthetic Rubber Book should be addressed to Department 20, Mechanical Goods Division, United States Rubber Company, Rockefeller Center, N. Y. C.*

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Mechanical Rubber Goods Division • Rockefeller Center • New York

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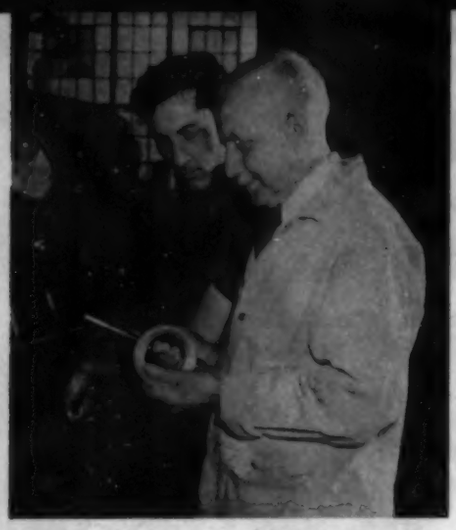

Retired machinists are recalled to train white-collar operators. Page 56

STEEL

The Magazine of Metalworking and Metalproducing

MARCH 15, 1943

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Published by The Penton Publishing Co., Penton Building, Cleveland, Ohio. E. L. Shaner, President and Treasurer; G. O. Hays, Vice President; F. G. Steinebach, Secretary.

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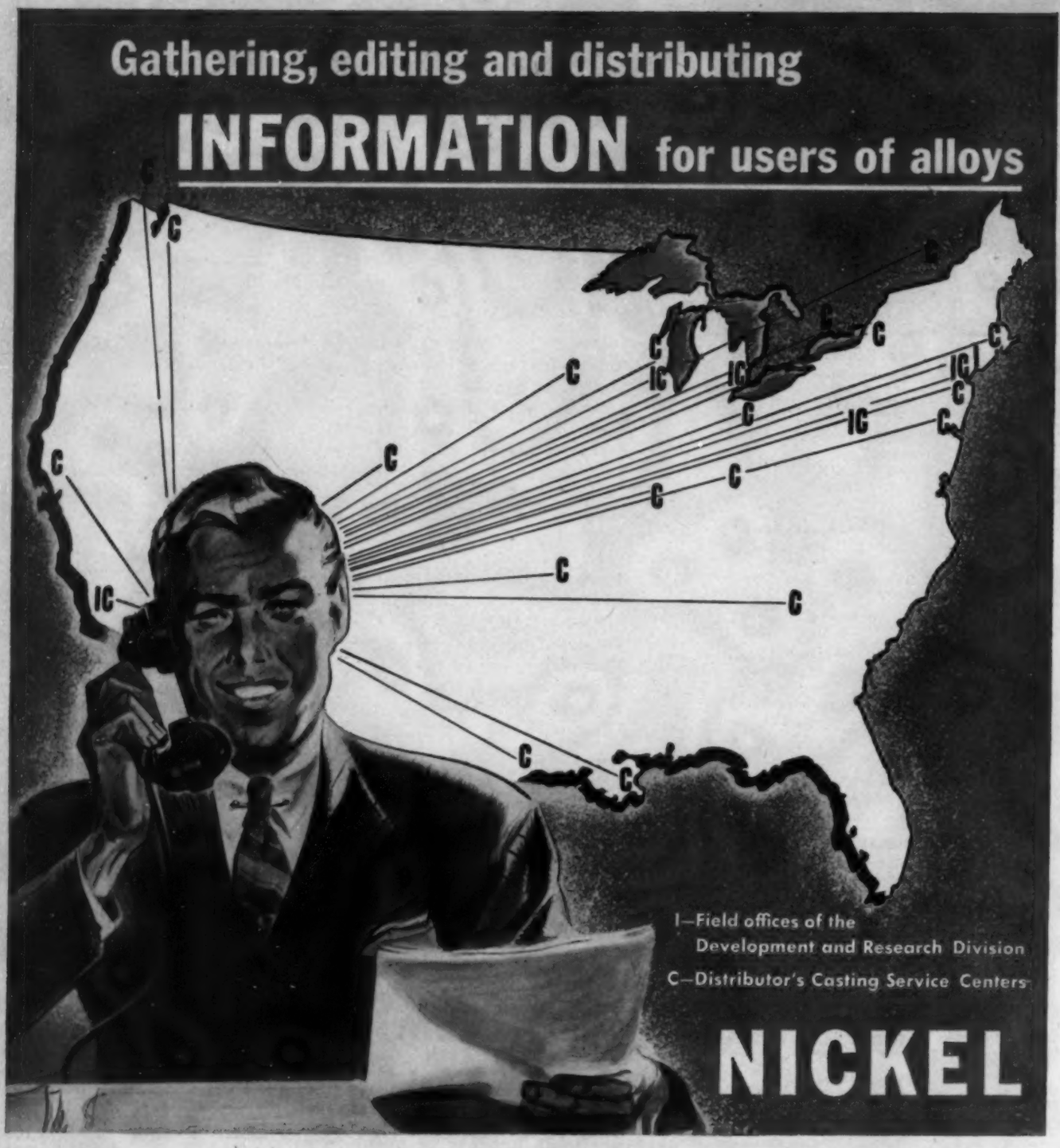
Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $6; two years $10; all other countries, one year $12. Single copies (current issues) 25c.

Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879. Copyright 1943 by the Penton Publishing Co.

Gathering, editing and distributing INFORMATION for users of alloys



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HIGHLIGHTING

this issue of STEEL

MANPOWER Acceptance of the split-shift plan, whereby white-collar workers employed full-time in their regular pursuits, work a half shift in a war plant, has been limited, a survey (p. 56) by STEEL reveals. Employers, however, are considering the plan for future adoption if the shortage of laborers becomes more acute. Contradicting statements by Washington officials, most war plant operators report no serious shortage of untrained workers as yet. They are reluctant to train two men for a job if full-time workers are available. . . The automotive industry has organized a committee (p. 59) to study the most effective utilization of available labor supplies. . . National War Labor Board has rejected (p. 62) a union demand for the "hiring hall" system of employment on the Great Lakes.

FINANCIAL Income on investments of the iron and steel producers declined approximately 3.4 per cent last year (p. 89). At the same time the aggregate net income of 57 iron and steel consumers in 1942 decreased by $60,901,956 or about 23 per cent. A table shows the earnings of the companies in 1941 and 1942.

SUBCONTRACTING War procurement agencies last week were asked by Col. Robert W. Johnson, chairman of the Smaller War Plants Corp., to use their influence with prime contractors to extend (p. 63) farming out of war production work to smaller plants. . . Chrysler Corp. (p. 75) has subcontracted 58.2 per cent of its two billion dollars in war contracts, and is doing business with 8079 companies.

AVIATION Sixty per cent of this country's military planes are being produced by eight companies in southern California (p. 78). . . Principles of automotive mass production have been adapted to the assembly of large gliders (p. 80) at the Ford station wagon body plant. . . Steps are being taken by the WPB Steel Division to assure the aircraft industry of an adequate supply of alloy steels (p. 82).

IN THE NEWS Metallurgists report that the hardening influence of boron in extremely small amounts as an alloying element is a startling revelation (p. 83).

Recent action of the War Production Board authorizes production of additional farm equipment recommended by Food Administrator Wickard (p. 72).

Vital importance of postwar planning is indicated by the amount of literature written on the subject by the country's outstanding educators and economists. Windows of Washington (p. 67) devotes its pages to the publication of a bibliography of material available on the subject as presented by the National Planning Association.

Steel ingot production in February was at the second highest weekly rate in history (p. 61).

WAREHOUSES General of Operations, Curtis Calder, Director WPB, has taken steps to place in operation by April 1 a plan for regional control of steel warehouses in the acute San Francisco Bay area (p. 85). . . This, it is believed, may be the solution to the problem of maintaining stocks needed to serve the small and emergency needs of essential industries there.

TECHNICAL Special alloy addition agents save important amounts of strategic alloying elements yet produce steels to meet specified tensile and impact values, are one of the "hot" developments in wartime steelmaking. Much information on performance of these addition agents (p. 94) is presented by the American Iron and Steel Institute.

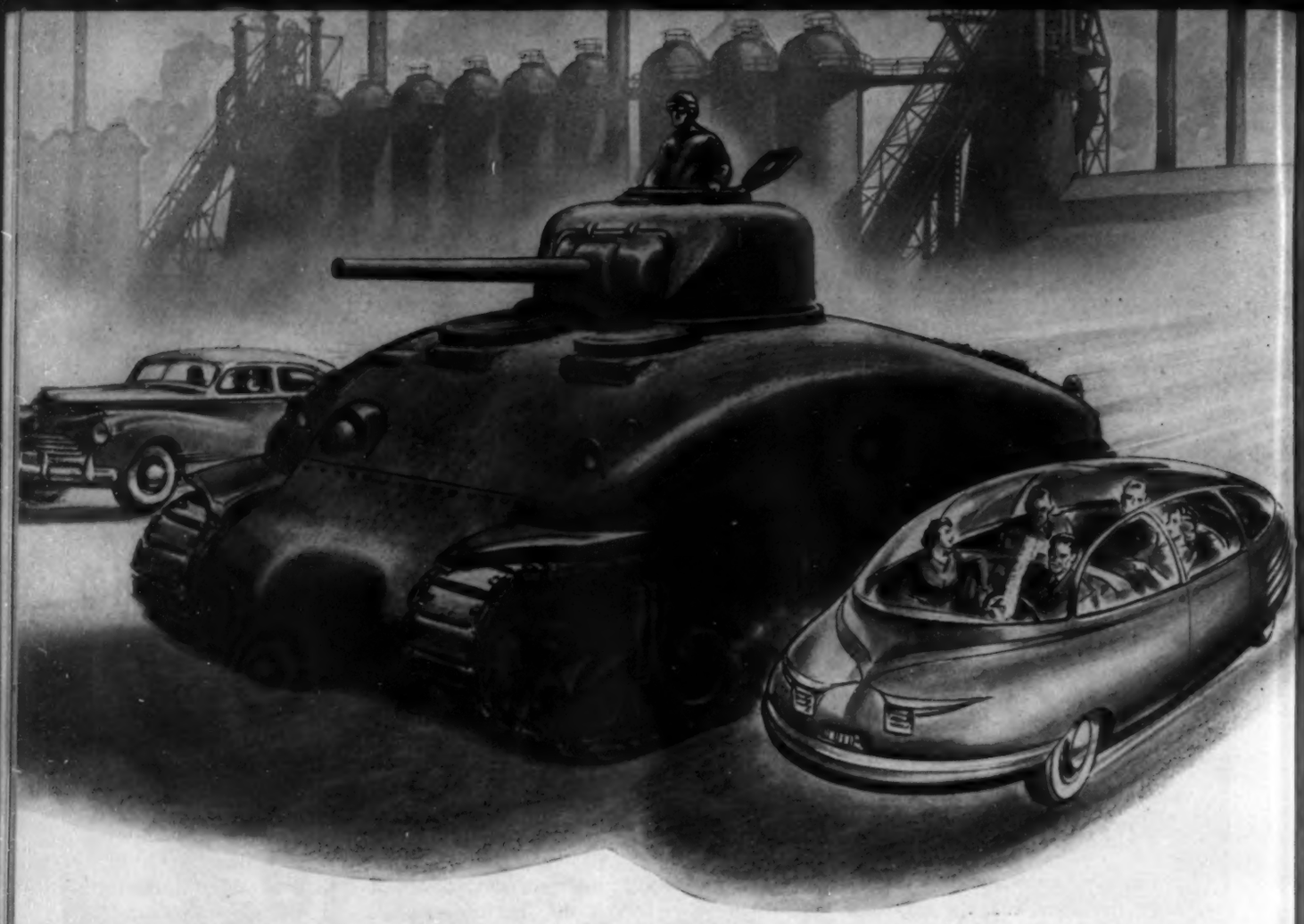
In user report No. 11 on experience with the NE alloy steels, A. S. Jameson details what International Harvester Co. has found out about the medium carbon NE-9440 and NE-9640 steels (p. 96). He also includes information on standard alloy compositions for which these two steels could be considered as substitutes.

An unusual drawing press (p. 104) was found the answer to the job of turning out more than 20,000 large cowl ventilators faster than shipyards on our three coasts required them for Liberty ships. Huge press draws ventilators in two sections, subsequently welded together.

Some concept of the volume of export boxing being done by large manufacturers is obtained when it is learned that Yellow Truck & Coach plant now boxes in one day more than it formerly did during the entire year of 1938. Obviously greatly improved methods are being used (p. 108).

Murray S. Kice presents the first part of a detailed discussion (p. 110) on industrial fans for ventilating, blast heating and air conditioning work. Many factors connected with industrial process fans and their application greatly influence plant earnings, he points out.

G. B. Berlien, in the first of a series of four articles on straightening heat-treated parts, gives some pointers on methods of controlling and correcting distortion in oil-hardening steels (p. 114).



From Automobiles to Tanks *and Back to Automobiles*

Throughout the years before Pearl Harbor, Inland supplied great quantities of many kinds and forms of steel to the automotive industry. When a manufacturer wanted steel of special form, finish, or analysis, Inland research and mill men supplied those wants. Often original work by our research staff developed new steels, which were used to build better automobiles. Inland grew with the automotive industry and that industry grew with Inland.

When war came to America, Inland was prepared, with skilled men and modern equipment, to supply a vital part of the steel needs of the automotive industry, converted 100% to the production of army trucks, tanks, jeeps, shell, and many other kinds of war equipment.

Now as in the past, Inland metallurgists and mill men are making new and better steels—steels that give our fighting men the advantage—steels that will help build better automobiles when our enemies have met the terms—"unconditional surrender."

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STEEL
March 15, 1943

Wages for What?

If the government were to call in the ablest experts on methods of compensating industrial wage earners in wartime, and were to ask them to submit the worst plan of remuneration they could devise, the result could not be as bad as the hit-or-miss system which now prevails in this country.

Relatively few employes are being paid in accordance with the work they perform. For every man or woman whose paycheck is keyed to performance, there are scores who are compensated on the basis of other factors.

For instance, miners are asking for more money and part of the increase is intended to compensate the men for an increase in union dues. An effort is being made to break the "Little Steel" formula, which ties wages to a cost of living index and has little to do with the volume of work performed.

Throughout industry one rate is paid for certain hours, time-and-a-half for others and double time for still others. These rates have no connection whatever with performance. In some instances, workers in featherbedded jobs are paid, not for what they do, but for what somebody would have to do if we were back in the horse-and-buggy days.

The nation winked at these absurdities in peacetime, but in wartime they assume a serious aspect. No longer are we in a make-work economy. We are in a do-all-we-can economy. Our plans for compensation should be geared to this new concept.

One way out of the present confusion would be to place less emphasis upon unit hourly wages and more upon real wages—the usable income one earns in a year's time. Another would be to pay according to results, which in many instances would mean relying more heavily upon incentive plans.

The experience of war has caused Russia and England to turn toward real wages and payment by results. We could profit by their example.

E. L. Shaner
Editor-in-Chief

Plan Wins Only Limited Acceptance in War Plants

General manpower shortage apparently not yet acute enough to force part-time employment of white-collar workers. Employers studying experiences with plan as potential labor source in future

SPLIT-SHIFT employment of white-collar workers in war plants, inaugurated on an experimental basis by a few companies several months ago to alleviate the widely heralded manpower shortage, has not yet been adopted to any great degree.

A survey by STEEL of leading centers of war production, including many designated as "critical" labor areas, reveals manufacturers have considered the plan but have deferred action because they still are able to obtain full-shift workers.

They freely admit the merits of the idea but ask: "Why should we train two men to do the job of one when we still are able to hire full-time employes?" They acknowledge the plan offers a tremendous potential supply of labor for war plants that may be called into service within the next three or six months.

Personnel managers generally agree that white-collar workers can be more easily trained and developed into better workers for many jobs than many people now being hired on a full-time basis.

"They may lack 'job knowledge,' but they possess initiative, intelligence, and generally good education," said one employer. "We have found that salesmen, office workers and similar people dislocated from their regular jobs by the war program adjust themselves readily to plant work. They require less training on new jobs and often turn out better work than the type of people who ordinarily apply for factory work."

Fit Into Assembly Work

Seldom are the white-collar workers expected to acquire the skill of a highly-trained artisan. They can, however, acquire the skill necessary for assembly work and the simpler machining operations, thus releasing more highly trained workers for jobs requiring greater skill.

When the time comes for wide-spread adoption of the split-shaft plan, there should be no dearth of applicants, according to present indications. In almost every war material manufacturing center covered by STEEL's survey, spontaneous offers by professional and clerical workers to join in the plan were reported.

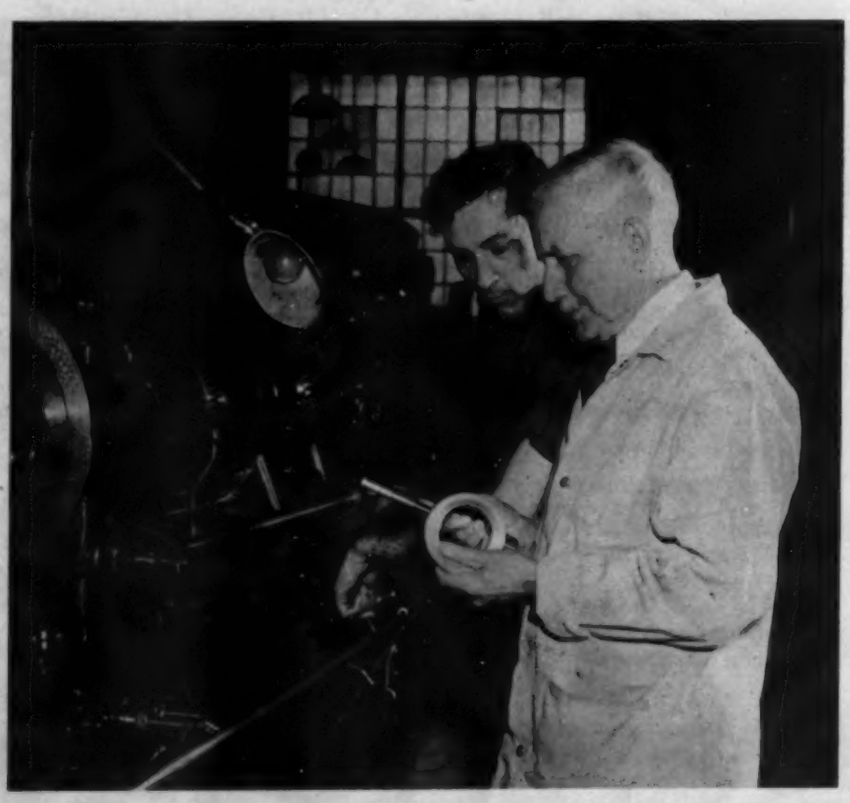
In Cleveland, for example, the Junior Chamber of Commerce proposed such a program and promptly obtained 150 volunteers for war plant work. About 125 industrial plant managers were approached, but practically all turned thumbs down on the plan for the present. Many said that future conditions might make the plan desirable.

The New York regional WMC and district United States Employment Service reported they had many applications from persons employed in civilian industries. Many offered to work for nothing. But in general, these agencies have been unable to place such applicants. A USES official said the split-shift idea "simply hasn't taken hold with New York district plant managers." Employers in the New York area are not yet pressed for workers except in the highly-skilled classes.

Employment managers in the New York area, however, believe it will be merely a matter of time before an acute shortage develops and think that personnel directors would be well advised to make plans for utilizing white-collar labor. At present, New York proper has a labor surplus estimated at between 200,000 and 300,000. This situation is reflected immediately in adjacent localities.

In Detroit, the half shift plan has not progressed beyond the preliminary discussion stages. Current opinion is that the labor supply has not become sufficiently critical to make the split-shift worthy of adoption.

Vickers Inc. and Ex-Cell-O Corp. have discussed the plan tentatively within their personnel and employment departments, but have taken no definite steps toward adopting the idea as yet. Detroit employers are interviewing several hundred prospective workers daily and as long as this situation maintains the



Veteran machine specialist, retired for ten years, is recalled to active duty to instruct new workers in the operation of automatic screw machines. Many of the new workers formerly were employed in white collar jobs

split-shift plan will be tabled. Detroit's labor supply is running low on skilled workers and most new employes must be trained before they can become productive. However, this applies to office personnel and white-collar help as well as plant personnel.

Whatever labor shortages there are in the Detroit district appear to be in civilian services.

In Pittsburgh, personnel managers say that the manpower shortage is not yet critical enough to resort to the half-shift system. A number of companies are considering the plan and a few are experimenting with it on a trial basis.

The few companies which have inaugurated the half-shift system report that it is working very satisfactorily. One of the pioneers was the Warner & Swasey Co., Cleveland, which instituted the plan last November with several teams of white-collar workers on a purely experimental basis. In the past three and one-half months the number of teams has increased to 166 and more are being added daily.

The plan is regarded by Warner Seeley, company secretary, "as a definite help in production because of the critical shortage of manpower."

Warner & Swasey are hiring white-collar workers for the split-shift as rapidly as they apply. The company does no advertising for this type of worker but relies upon word-of-mouth promotion. Applicants must receive approval by their full-time employers, pass a physical examination and must be available to work four hours a day, six days a week. No women as yet have been hired.

Workers Like Plan

The split-shift workers contend that "long hours do not appear to be long hours because the industrial shift has a recreational quality similar to a hobby." Teachers, salesmen, coal company executives, attorneys, a cartoonist and several food and electrical appliance salesmen compose the "charter" teams of the split-shift program.

Attendance has been one of the most encouraging aspects of the Warner & Swasey experience with the split-shift plan. Absenteeism among this group of workers is at the amazingly low rate of one-half of one per cent. Whenever one of the team is unable to report for work because of illness or other cause the other member of the team works the entire eight-hour shift.

Walter C. Mason, assistant personnel manager, reports the company is expanding the size of the split-shift force because white-collar workers "fit in well," are well educated and ordinarily do not require long periods of training. They are easily adaptable to many types of mechanical work.

In age, Warner & Swasey split-shifters range from 28 to 50, with an average of about 35. Men over 50 have not been excluded but few have applied because, it is believed, they could not stand the physical strain of two jobs.

"At 48 I thought I was getting too old but after working here I feel I can do anything a young man can do," said a coal executive, one of the first split-shifters. "Naturally cocktail parties are out since I'm tired when I get home. But I really have an appetite and my wife can't seem to give me enough to eat. I lost 18 pounds and can afford it. I'm in better physical condition now than ever before."

A cartoonist working on assembly said "for 15 years I've been an artist and teacher of drawing but if this work contributes to ultimate victory that is all that matters. However, since I'm still able to do my own work this factory work provides a satisfying break in daily routine."

An attorney who dresses nattily during his business hours and later in the evening can't be recognized for a covering of grease and oil from his production job said that "for nearly three months I've been working here. The men all feel grateful for the opportunity to participate in war production. In fact they desire to learn quickly in order to increase production. Since most of these men are office workers ordinarily, the physical activity of the added four hours shop work is, to some extent, a relaxation and not a severe drain on physical stamina."

"The men are pleased with the attitude of the full-time workers who accept us and aid us in proficiency," he added. "These men consider it a patriotic privilege as well as patriotic duty to be the man behind the man behind the gun."

Watson Elevator Co., Edgewater, N. J., was one of the first metalworking com-

Winchester Repeating Arms Co., New Haven, Conn., draws on Yale University students for the first half of its split shift. Store owners, salesmen and others whose regular jobs keep them employed until late in the day make up the second half of the shift. Company is manufacturing Garand rifles

panies in the East to adopt the split-shift system. The company, which normally employs about 400, converted to war work and required more employes as well as a flexibility in employment due to design changes inherent in war work.

Due to the latter cause the split-shift, drawing upon persons who already held steady jobs, settled the company's problem.

Watson officials established close relationship with the USES and with two New Jersey vocational schools. USES is constantly advised as to the number of split-shift workers required and in turn advises applicants as to the type of work, schedules, wage rates, and other details concerning the available jobs. Interested applicants then are referred to the company for possible training and employment.

Training course expenses are paid by the government. During the early stages, training courses usually ran about six weeks. No one was sent out to a job unless the training school officials were satisfied that he could meet requirements. As the program progressed and needs became clarified the average length of the training course was reduced to three weeks.

Watson and school officials found that much depended upon the education of the trainee. For some there was no need for training in elementary mathematics; they were started off with instructions for reading blueprints, use of micrometers, and more advanced but fundamental types of training.

Watson set up a 12-hour shift from 8 p.m. to 8 a.m., with a six-hour split for each member of the team. All employes are men ranging from 35 to 50 years of age. They have been recruited from various vocations, law, real estate, teaching, business.

Practically no absenteeism has been noticed at Watson and split-shifters say the extra hours do not constitute a physical burden.

Employment Not Steady

Split-shifters are informed by Watson that their employment may not be steady. This constitutes no particular hardship because the workers are not dependent on the half-shift jobs for their living. Watson officials also emphasize the importance of not letting the split-shift program get out of balance, that is, not employing too many split-shifters for the number of supervisors and trained mechanics.

The split-shift system has been applied rather extensively in labor-short Connecticut. Last autumn manpower officials in Hartford were "scraping the bottom of the barrel" for skilled workers. The area had a heavy concentration of war orders with more to come. Thousands of new workers were hired; more thousands were required. Meanwhile, selective service continued to drain off large numbers of skilled employes.

Connecticut, home of many life insurance companies, had thousands of white collar employes who, though reluctant to give up the security of their desk jobs, were anxious to do their part in winning the war. They applied to USES offices, seeking employment in war plants. For a time they were given no encouragement.

Finally, an USES manager approached a large aircraft motor manufacturer. He said: "We have here hundreds of conscientious men and women. Many are skilled, some are engineers, all of them want to have a part in winning the war. They will be good workers." The aircraft motor manufacturer agreed to take on a number of the applicants on the half-shift basis. It worked out satisfactorily.

In nearby New Haven, the Winchester Arms plant, manufacturing Garand rifles, has taken on scores of half-shift employes. For the first turn, from 4 p.m. to 8, many Yale University students are employed; for the second half of the turn the plant draws on store owners, salesmen, professional people and housewives.

Contrary to other centers where the plan has been tried, Connecticut factories employ about one-third women as part-time employes.

Connecticut half-shifters report they like the idea; and employers find it the best possible solution to an acute labor shortage.

White-collar worker welds a thin disk of steel on the base end of a 75-millimeter shell in an ordnance manufacturing plant

Only an "Idea" in Chicago District

CHICAGO

The "half-shift" plan for expanding the manpower reservoir appears to be only an idea insofar as the Chicago industrial area is concerned. While many employers and others interested in the labor problem have some knowledge of the plan being utilized to good advantage in eastern sections of the country, few have a complete understanding of its mechanics or application.

Reason for this is that there is as yet no acute manpower shortage in Chicago and the adjacent midwestern area. Despite the fact that some of the nation's largest war plants have been constructed here, the supply of men to man them

has thus far been adequate to meet demand. Several of the plants still are under construction, and the best informed sources feel that until they are completed and go into full operation—perhaps six months hence—the manpower situation will not become critical, if it does then.

Chicago, because of its size, offered a large potential reservoir of workers at the outset of the war effort. Despite depletions from men being called into the armed forces, the gaps have been filled quickly by men suffering dislocations in their former jobs in producing peace-time products, by men shifting from non-war to direct war work jobs, and by women stepping into industry for the first time. For example, many men, such as elevator operators in office buildings, are going into war plants, and this potential has been exhausted by no means. And neither has the supply of women been fully tapped

Furthermore, some war plants are employing fewer workers now than they did a year ago. This is a result of de-emphasis on certain items, such as ordnance, or changes in design which have involved retooling or revamping of production facilities. Workmen, so released, have migrated to other plants.

So, until present manpower supply becomes exhausted, or a near-critical stage is reached, it is not likely that the half-shift plan will receive serious consideration. It involves certain mechanical difficulties and drawbacks which employers are reluctant to confront until forced to do so. It is understood that the regional WMC advisory body has not given discussion to the half-shift idea in its approach to the local manpower problem. Likewise, it is apparent that other government agencies, such as the United States Employment Service, are not giving the plan consideration. In fact, it might be said they are unsympathetic, at least so far, to the few efforts which have been made to try out the half-shift. And it goes almost without saying that the attitude of labor unions is not conducive to adoption of the plan.

Attorneys Volunteer

Last fall, a group of attorneys, all members of the Chicago Bar Association, undertook to engage in war production work on a part-time basis, utilizing the half-shift plan. At the outset, the group numbered 480, which expanded to 600 as the organization was perfected. Many of these lawyers were already mechanically minded, either being technically trained, or were following such pursuits as hobbies, and all joined up in the movement with serious intent. They soon discovered, however, that industry was not yet prepared to undertake the half-shift plan. Although they frequently received sympathetic audiences and interviews, they were unable to sell their idea and put it to work.

However, about 10 per cent of the group, or a total of about 60, did find war plant employment, but only on a full shift, or 8-hour, basis. In most cases, these lawyers work in plants on the second or third shift, which enables them to spend a few hours in their law offices each day to keep their practices established.

Spokesman for the group of attorneys, James P. Economos, states that at present about 280 members are pursuing training, in high school night classes, trade schools, or other institutions, to prepare themselves for half-shift employment, if and when the plan is accepted. He asserts further that if the plan should go into use, his group would expand almost immediately to a total of 2000 available for employment, a reservoir which would represent the equivalent of 1000 men working full time. Mr. Economos pointed out that the policy of his group is to accept whatever labor conditions may prevail in shops which they enter. That is, half-shifters will join unions if that is a requirement for employment, for there is no desire to upset applecarts, or otherwise promote labor disharmony.

WORKERS' SERVICE STRIPES?

SERVICE bar pins similar to those worn by fighting men were suggested by Henry J. Kaiser as a means of combatting absenteeism in war plants. Appearing recently before the Senate committee investigating the war effort, the industrialist also proposed freezing union membership rolls for the duration. NEA photo

Automotive Council Launches Manpower Utilization Study

DETROIT

IN AN effort to concentrate its managerial talents toward obtaining the most efficient use of manpower throughout the far-flung plants of the automotive industry, the Automotive Council for War Production, co-operative agency representing 400-odd plants in the industry, has announced the organization of a manpower utilization division, headed by an 18-man executive committee.

Chairman of the committee is C. E. Wilson, president, General Motors Corp.; other top-ranking officials include:

W. F. Armstrong, vice president, Nash-Kelvinator Corp.
C. C. Carlton, vice president, Motor Wheel Corp.
George T. Christopher, president, Packard Motor Car Co.
W. J. Corbett, vice president, Sparks-Withington Co.
R. H. Daisley, vice president, Eaton Mfg. Co.
Foster L. Fralick, vice president, Koestlin Tool & Die Corp.
Ben F. Hopkins, president, Cleveland Graphite Bronze Co.
Royce G. Martin, president, Electric Auto-Lite Co.
G. W. Kennedy, president, Kelsey-Hayes Wheel Co.
M. J. LaCroix, assistant to vice president, International Harvester Co.
E. A. Clark, vice president, Budd Wheel Co.
C. J. Reese, president, Continental Motors Corp.
W. Dean Robinson, vice president, Briggs Mfg. Co.
I. B. Swegles, vice president, Hudson Motor Car Co.
H. L. Weckler, vice president, Chrysler Corp.
Ray Rausch, in charge of operations, Ford Motor Co.
Harold Vance, chairman, Studebaker Corp.

Mr. Wilson, at a press conference announcing the organization of the new activity, explained that the committee is essentially a fact-finding group which will attempt to analyze and correlate the knowledge of the broad cross section of industry it represents. Characterized as a "low-pressure activity," the committee's work will center on the compilation of factual data bearing on all phases of the manpower question, information which will point the way for subsequent action.

Up to this point, the automotive industry has not experienced any acute

shortage of personnel, in fact is not even scraping the "bottom of the barrel" of available supply. But it is pointed out that with the national supply of manpower acutely strained by continued expansion of the armed forces and the heavy requirements of both industry and agriculture, it is only a question of time before the motor industry will be confronted with major shortages in manpower, and it is to anticipate these eventualities that the new activity has been launched. It is likened to the council's similar co-operative activities in the fields of materials, machines and methods, where interchange of information among council companies has expedited war production.

C. E. WILSON

Chairman, Automotive Council for War Production committee for manpower utilization

On the immediate horizon for investigation are such subjects as absenteeism, training, housing and transportation, health and safety, employment of women workers, and the relation of employe attitude and morale to improved production. In short, all desirable methods, both inside and outside the plants, which assist the worker to increase output of war goods will be analyzed by specialists and transmitted to the industry as a whole.

One of the first specific tasks to be undertaken will be analysis of absenteeism, and before any causes and cures can be suggested it will be necessary to understand just exactly what is meant by absenteeism and how it can be expressed statistically to mean anything.

From the outset it is being recognized that men and women in plants cannot be handled like machines, that maximum co-operation of employes is dependent upon a minimum of restrictions. Of primary importance, also is the workman's attitude toward his job. Surveys taken in the Detroit district in recent weeks show that all workingmen are interested in turning out more production, but are faced with many restraints, some of them real and some of them fancied. It will be a function of the new manpower committee to investigate this matter further to obtain factual information which may be of benefit to the industry.

Another knotty problem to study is how to absorb sudden cuts in production schedules without undue layoffs and the consequent disturbance to employe morale; likewise the upsetting effect of unanticipated materials shortages.

Opinion in Detroit is that much of the national agitation over absenteeism and other manpower problems is being magnified beyond reality and that in the concern over such troubles, the country is failing to appreciate the size of the production job which is being accomplished. In launching a detailed study of manpower utilization, the automotive industry is recognizing that problems in this field may become more critical as time goes on, and thus is attempting to be forehanded in meeting and solving them as they arise.

Prentiss M. Brown, OPA administrator, last week requested regional directors to form labor advisory committees to work with OPA officials in ironing out problems of price and rent control, rationing, and to handle future developments.

Steel Corp. Shipments Set February Record

Finished steel shipments by the United States Steel Corp. in February were 1,691,592 net tons, an increase of 5599 tons over 1,685,992 tons in January. This was 75,000 tons greater than shipments in February, 1942, of 1,616,587 tons. The February total was the largest for that month in the history of the corporation.

For two months the total was 3,377,585 tons, compared with 3,355,480 tons in the corresponding portion of 1942 and the highest for this period in history.

(Inter-company shipments not included)

	Net Tons			
	1943	1942	1941	1940
Jan.	1,685,992	1,738,893	1,682,454	1,145,592
Feb.	1,691,592	1,616,587	1,548,451	1,009,256
Mar.	.....	1,780,938	1,720,366	931,908
Apr.	.....	1,758,894	1,687,674	907,904
May	.....	1,834,127	1,745,295	1,084,057
June	.....	1,774,068	1,668,637	1,209,684
July	.....	1,765,749	1,666,667	1,296,887
Aug.	.....	1,788,650	1,753,665	1,455,604
Sept.	.....	1,703,570	1,664,227	1,392,838
Oct.	.....	1,787,501	1,851,279	1,572,408
Nov.	.....	1,665,545	1,624,186	1,425,352
Dec.	.....	1,849,635	1,846,036	1,544,623
Total	.....	21,064,157	20,458,937	14,976,116
Adjustment	.....	.....	*42,333	†37,639
Total	.....	.....	20,416,604	15,013,749

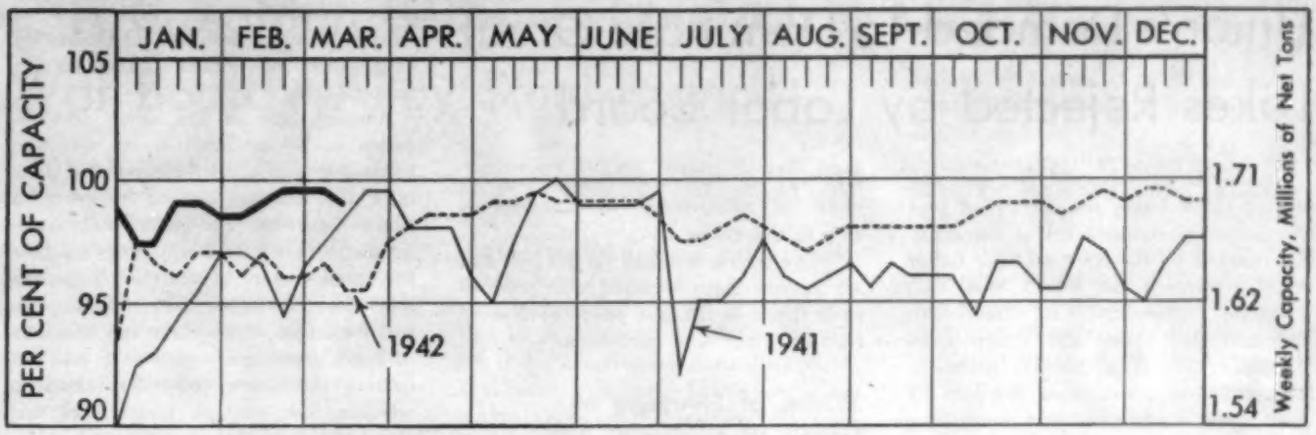
†Increase. *Decrease.

STEEL INGOT STATISTICS

	Estimated Production—All Companies									
	—Open Hearth—		—Bessemer—		—Electric—		—Total—		Calculated weekly production, all companies Net tons	Number of weeks in month
	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity		
Based on Reports by Companies which in 1941 made 98.5% of the Open Hearth, 100% of the Bessemer and 87.8% of the Electric Ingot and Steel for Castings Production										
1943										
Jan. . .	6,563,317	97.5	478,058	85.9	367,369	94.9	7,408,744	96.6	1,672,403	4.43
Feb. .	6,020,008	99.1	447,843	89.1	344,031	98.5	6,811,882	98.3	1,702,970	4.00
Based on Reports by Companies which in 1941 made 98.5% of the Open Hearth, 100% of the Bessemer and 87.8% of the Electric Ingot and Steel for Castings Production										
1942										
Jan. . .	6,328,128	95.4	490,864	86.0	305,930	96.3	7,124,922	94.7	1,608,335	4.43
Feb. .	5,791,813	96.7	453,543	88.0	275,700	96.2	6,521,056	96.0	1,630,264	4.00
Mar. .	6,574,701	99.1	493,294	86.4	324,916	102.3	7,392,911	98.2	1,668,829	4.43
1st quar	18,694,642	97.0	1,437,701	86.7	906,546	98.3	21,038,889	96.3	1,635,994	12.86
April .	6,346,707	98.8	454,583	82.2	321,023	104.4	7,122,313	97.7	1,660,213	4.29
May .	6,600,376	99.5	454,064	79.5	332,460	104.7	7,386,890	98.2	1,667,470	4.43
June .	6,247,302	97.2	452,518	81.8	322,335	104.8	7,022,155	96.4	1,636,866	4.29
2nd qtr	19,194,385	98.5	1,361,155	81.2	975,818	104.6	21,531,358	97.4	1,654,985	13.01
1st half	37,889,027	97.8	2,798,856	83.9	1,882,364	101.5	42,570,247	96.9	1,645,545	25.87
July . .	6,350,047	95.7	453,684	79.6	345,093	96.3	7,148,824	94.5	1,617,381	4.42
Aug. .	6,420,498	96.6	467,313	81.8	345,642	96.3	7,233,451	95.4	1,632,833	4.43
Sept. .	6,297,201	98.0	437,950	79.4	331,933	95.7	7,067,084	96.5	1,651,188	4.28
3rd qtr.	19,067,744	96.8	1,358,947	80.3	1,022,688	96.1	21,449,359	95.5	1,633,615	13.13
9 mos.	56,956,771	97.4	4,157,803	82.7	2,905,032	99.5	64,019,606	96.4	1,641,528	39.00
Oct. . .	6,757,696	101.6	461,895	80.9	365,273	101.7	7,584,864	100.1	1,712,159	4.43
Nov. . .	6,378,661	99.1	458,426	82.9	347,473	99.9	7,184,560	97.9	1,674,723	4.29
Dec. . .	6,471,465	97.6	475,124	83.4	356,590	99.5	7,303,179	96.6	1,652,303	4.42
4th qtr	19,607,822	99.4	1,395,455	82.4	1,069,336	100.4	22,072,603	98.2	1,679,802	13.14
2nd hlf	38,675,566	98.1	2,754,392	81.3	2,092,004	98.3	43,521,962	96.8	1,656,717	26.27
Total. .	76,564,593	97.9	5,553,248	82.6	3,974,368	99.8	86,092,209	96.9	1,651,174	52.14

The percentages of capacity operated in the first six months of 1942 are calculated on weekly-capacities of 1,498,029 net tons open hearth, 128,911 net tons bessemer and 71,682 net tons electric-ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942, as follows: Open hearth 78,107,260 net tons, bessemer 6,721,400 net tons, electric 3,737,510 net tons. Beginning July 1, 1942, the percentages of capacity operated are calculated on weekly-capacities of 1,500,714 net tons open hearth, 128,911 net tons bessemer and 81,049 net tons electric-ingots and steel for castings, total 1,710,674 net tons; based on annual capacities as follows: Open hearth 78,247,230 net tons, bessemer 6,721,400 net tons, electric 4,225,890 net tons.

Percentages of capacity for 1943 are calculated on weekly capacities of 1,518,621 net tons open-hearth, 125,681 tons bessemer and 87,360 tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of Jan. 1, 1943, as follows: Open-hearth 79,180,880 net tons, bessemer 6,553,000 net tons, electric 4,554,980 net tons.



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,408	6,811	....	....	....	....	....	....	....	....	....	....
1942	7,124	6,521	7,392	7,122	7,386	7,022	7,148	7,233	7,067	7,384	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150

PIG IRON PRODUCTION

1943	5,194	....	....	....	....	....	....	....	....	....	....	....
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,598	4,551	4,766	4,784	4,721	4,860	4,707	5,014

February Second in Weekly Ingot Rate

Only shortness of the month prevented the steel industry from making February the second largest month on record in steel production. An average of 1,720,970 net tons of steel ingots was produced per week in February, exceeded only in October, 1942, with 1,712,159 tons weekly average, the American Iron and Steel Institute reports.

Total production for the month was 6,811,882 tons, compared with 7,408,744 tons in January but substantially above 6,521,056 tons made in February, 1942. Average weekly production in January was 1,672,403 tons and in February, 1942, it was 1,630,264 tons.

During February the industry operated at an average of 98.3 per cent of capacity as of Jan. 1, 1943. In January the average was 96.6 per cent. In February last year the average was 96.0 per cent of the capacity then available.

Plate Production Sets New Daily Record in February

Steel plate production during February reached a new high daily rate, Hiland G. Batcheller, WPB Steel Division Director, has announced.

Average daily shipments in February were 38,285 net tons, while shipments for the month totaled 1,072,001 tons. This compares with a daily rate of 36,626 tons and a total of 1,135,413 tons in January, a longer month. Shipments in February, 1942, totaled 758,723 tons.

Schedules of plate mills indicate a new all-time record tonnage for March, thus keeping pace with the increased rate of shipbuilding operations and with other essential demands for plates.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Mar. 13	Change	Same week 1942	Same week 1941
Pittsburgh	100	+1	95	100.5
Chicago	101	None	103	99
Eastern Pa.	95	None	88	96
Youngstown	97	None	94	97
Wheeling	84.5	None	81.5	88
Cleveland	92.5	None	91	98
Buffalo	90.5	—2.5	79.5	90.5
Birmingham	100	None	95	90
New England	95	None	95	92
Cincinnati	85	—6	80	89
St. Louis	88	—3	83.5	93
Detroit	91	None	87	93
Average	99	—0.5	*95.5	*98.5

*Computed on bases of steelmaking capacity as of those dates.

Approves Longer Work-Week for Mills Rolling Bars from Rails

Mills rolling steel bars from old rails may exceed the 40-hour week schedule to provide more steel for farm equipment, Director Batcheller, WPB's Steel Division, announced last week. These mills had been held to 40 hours to balance tonnage equitably. Re-rolling mills continue to operate less than 40 hours per week despite the fact there are no limits on reinforcing bars. Those on schedule above 40 hours have specific quotas.

Ingot Rate 99 Per Cent, Off ½-Point

Production of open-hearth, bessemer and electric furnace ingots last week was at 99 per cent of capacity, down ½-point from the prior week. One district advanced, three declined and eight were unchanged. A year ago the rate was 95½ per cent; two years ago it was 98½ per cent, both computed on capacity as of those dates. Pittsburgh rose 1 point to 100 per cent, the first time it had touched that level since Aug. 30, 1941. Buffalo, Cincinnati and St. Louis made slight declines, all on account of need for open-hearth repairs.

Book Record Number of Industrial Trucks in '42

Domestic bookings of electric industrial trucks and tractors rose to a record total of 5103 units in 1942, with combined value of $21,881,510, according to the Industrial Truck Statistical Association, Chicago.

Included were 245 non-elevating platform trucks valued at $569,962; 3735 cantilever trucks with total net value of $15,556,994; 272 light and heavy-duty tractors worth $500,027; 793 crane trucks with net value of $4,969,851, and 58 special trucks worth $284,677. Bookings in December increased to 591 from an all-year low of 188 in November. Peak month of 1942 was May when 760 units were booked.

Union's Demand To Dominate Great Lakes Rejected by Labor Board

DEMAND for a union hiring hall system on Great Lakes ore carriers of four transportation companies was categorically rejected by the National War Labor Board. Affected are Inland Steel Co., Interstate Steamship Co., Bethlehem Transportation Corp. and International Harvester Co. The decision indirectly is expected to affect other shippers by establishing a precedent and forestalling similar demands on them by the National Maritime Union.

Clarence B. Randall, Inland Steel vice president, lauded the board's decision as wise, but confessed at the same time that "the text of the order leaves the subject in confusion."

Mr. Randall said, "We are ordered to maintain a certain percentage of union men," which he held was discrimination and a violation of the Wagner act because, in order to maintain that "certain percentage of union men" it is necessary to ask a man if he belongs to a union. In certain cases union men would be discriminated against; in others, nonunion men.

He stressed what he termed a "contradiction" to this in another part of the text which "expressly says that we should not discriminate because of membership or nonmembership in the union."

Mr. Randall's statement:

"The War Labor Board has categorically rejected the demand of the National Maritime Union for setting up the union hiring hall on the Great Lakes.

"To this extent the decision is wise. Those who believe in private management under the American system will be cheered at this news.

"Whether or not wages should be increased is solely a question of national policy in the time of war, but there could be no two opinions about the hiring hall with its rotary system of employment which would deny the captain the right to select crews on merit and grant promotion on merit.

"But I must confess that the text of the order leaves the subject in confusion.

"On the one hand we are ordered to maintain a certain percentage of union men. This is discrimination. It violates the Wagner act, and it violates the pledge which the President gave to the nation that no man would have to join a union to get a job.

"And the order itself is contradictory, because in another paragraph it expressly says that we should not discriminate because of membership or nonmembership in the union.

"Nevertheless we shall do the best that we can to comply with the order, and we shall make an earnest effort to live on friendly terms with the union."

Warns of Shortage of Inland Waterway Sailors

Warning that the tightening labor situation in inland waterway transportation threatens to become critical soon because of proposed oil transportation over lake and inland routes, Otto S. Beyer, director, Division of Transport Personnel, Office of Defense Transportation has appealed to men in nonessential occupations who have actual sailing experience to accept employment in some essential water transportation activity.

WPB Orders Free Movement of Coal, Grain on Great Lakes

War Production Board last week ordered temporary suspension of preferential treatment of ore cargoes to permit a free movement of coal and grain on the Great Lakes before the heavy 1943 ore traffic begins.

Earliest ore shipping possible is believed to be about April 1 and the opening may be postponed further by continued cold weather. A 7 per cent increase in tonnage is anticipated over the 1942 ore traffic because of improved shipping facilities. About 95,000,000 gross tons is tentatively set for this season's movement.

MEETINGS

Production Shortcuts To Be Revealed at Milwaukee

An entirely new process for assembling aircraft structures figures prominently among the new developments to be revealed at the Machine and Tool Progress exhibition scheduled to be held at Milwaukee concurrently with the national meeting of the American Society of Tool Engineers March 25 through 27.

The process, it is understood, is neither welding nor brazing, but a combination of the two. It works through induction heating, it is said, and requires less skill than either conventional welding or riveting.

Main purpose of the exhibition is to assist manufacturing organizations in current retooling problems, in facilitating employment of women and conserving materials.

Among some of the other developments to be exhibited is an induction hardening unit which hardens steel parts in a few seconds instead of hours; a simple fixture that can be mounted on the magnetic chuck of a grinding machine for quickly and accurately sharpening tools for automatic screw machines; a tool for lathes which eliminates necessity of finish grinding of small parts now requiring the use of centerless grinders; welding rods of high speed steel that serve to repair broken cutting tools; inspection devices which permit measuring surface finish even in holes as small as ⅛ of an inch in diameter and a new optical comparator which quickens the checking of precision parts.

Other developments to be witnessed at the national meeting include new lathes, refined vises, grinders, lubricants, educational films and other delicate instruments used in conjunction with precision work.

Rounds Out Program for Open-Hearth Conference

"Sustained Production of Quality Pig Iron and Steels for Victory" will be the theme of the National Open-Hearth Conference, Hotel Statler, Cleveland, April 29-30. The tentative program follows:

Thursday Morning, April 29

Chairman: G. Reinhardt, Youngstown Sheet & Tube Co.

Topics: Personnel Problems, with accent on absenteeism and safety.

Thursday Afternoon

Refractories Session

Chairman: John Golden, Carnegie-Illinois Steel Corp.

Topics: Keeping Open-Hearth Bottoms in Condition, The Basic Roof, Furnace Maintenance, Hot Topping Steel.

Operations Session

Topics: How to Maintain Equipment During Full Operations, Control of Flush-Off Slags, How to Bottom-Pour on Ingot Cars, Present Status of Automatic and Other Control Equipment, Effects of Substitute Fuels on Rate of Production, Steel Cinder Pots, Handling Big Chunks of Scrap, Diesel and OilElectric Diesel Engines Used in the Open-Hearth Shop, Use of Bessemer Blown Metal in the Open-Hearth Furnace, Use of Cupolas in Open-Hearth and Electric Furnace Practice and Maintenance of Hot Metal Mixers.

Friday Morning, April 30

Raw Materials Session

Chairman: Harry Walther, Timken Roller Bearing Co.

Topics: Use of Steel Turnings in Open-Hearth and Electric Furnace, Standard Marking of Alloy Scrap, Use of Detinned Scrap, Cleaning of No. 2 Heavy Melting Scrap, Limestone versus Burnt Lime, Use of High Percentages of Hot Metal, Use of Spar, Progress in Reduction of Use of Aluminum and Ferromanganese, Reclamation of Scrap from Dumps, and Future Prospects of Scrap Collection.

Friday Afternoon

Steel Quality Session

Topics: Report on open-hearth fellowship by Drs. Chipman and Fitterer. A symposium on the manufacture of NE steels, cause of flaking of NE steels, alloying effect of Boron, manufacture of cartridge steel, handling of sensitive or air-hardening steels, and use of natural graphite in runners as a recarburizer.

L. E. Creighton Becomes Chief of War Board's Alloy Steel Branch

LOUIS E. CREIGHTON, Detroit, formerly vice president and general manager of the Rotary Electric Steel Co., has been appointed chief of the WPB Steel Division's Alloy Steel Branch. He succeeds William J. Priestly who has resigned to return to his post as vice president in charge of research and development, Electro Metallurgical Co., New York.

Mr. Creighton has been serving as chief of the recently created Aircraft Alloy Steel Section. He will continue to handle this section for the present.

Before joining WPB, Mr. Creighton had many years of experience as a production executive with the Union Drawn Steel Co. and Republic Steel Corp. From 1939 to 1940, he was manager of Republic's carbon bar division.

Steel Division Director H. G. Batcheller has appointed Robert W. Wolcott, president, Lukens Steel Co., Coatesville, Pa., as a special assistant to handle problems of procurement, allocation, and use of iron and steel scrap.

WPB Chairman Donald M. Nelson, on the recommendation of Col. Robert W. Johnson, chairman, Smaller War Plants Corp., has appointed J. A. R. Moseley, Dallas, Tex., as a director of the corporation. Mr. Moseley, who has had several years experience as a small manufacturer of airplane parts in Texas, has been serving as WPB regional financial manager at Dallas. He fills the vacancy on the SWPC created by the resignation of William E. Shipley.

John F. Fennelly has been appointed director of the WPB Program Bureau. Mr. Fennelly will continue to serve as vice chairman of the Requirements Committee and chairman of the Program Adjustment Committee. Mr. Fennelly replaces Donald D. Davis, who was recently named WPB vice chairman for operations.

John Hamm, senior deputy administrator of OPA, has resigned, effective July 1.

Steel Tubing Committee Organized by Price Office

Ten executives in the steel tubing industry have been invited by Price Administrator Prentiss M. Brown to serve on a Steel Tubing Advisory Committee to counsel with OPA on pricing problems of the industry.

Committee will consider present and future problems arising in connection with steel tubing under revised price schedule No. 6 on iron and steel products.

Those invited to serve: J. Ireland, Republic Steel Corp., Cleveland; R. Lawson, Summerill Tubing Co., Bridgeport, Pa.; E. A. Livingston, Babcock & Wilcox Tube Co., Beaver Falls, Pa.; W. F. McConnor, National Tube Co., Pittsburgh; Wm. A. McHattie, Michigan Seamless Tube Co., South Lyon, Mich.; Charles E. Miller, Michigan Steel Tube Products Co., Detroit; W. B. Moore, Timken Roller Bearing Co., Canton, O.; F. J. O'Brien, Globe Steel Tubes Co., Milwaukee; H. E. Van Huffel, Van Huffel Tube Corp., Warren, O.; Aaron Waines, Ohio Seamless Tube Co., Shelby, O.

Truman Committee Charges War Contractors Hoarded Labor

The Senate's Truman Committee investigating the war program charged last week in its second annual report of more than 200 pages that some war contractors "have hoarded labor and pyramided costs".

The report, critical of the war effort but not disparaging of what has been accomplished, also declared that many large corporations which obtained the bulk of war contracts were "slow to spread subcontracts among smaller concerns".

The committee claims three weaknesses responsible for nearly all failures: 1. Delay in determining basic policies and conflicting authority resulted in "buck passing"; Inadequate overall planning with government agencies; 3. Hesitancy of government to adopt unpleasant policies long after facts clearly indicated such policies were necessary.

Use of CMP Allotments of Aluminum Clarified by WPB

Companies receiving CMP allotments of aluminum are authorized to use the metal for a specified group of end-products by order M-1-I as amended.

Aluminum may be used for the purposes listed in the revised order without further authorization. Use of aluminum for any other purpose must have special authorization in addition to the receipt of an allotment.

Delivery of aluminum for April against CMP orders in many cases has been authorized prior to obtaining end use information. Furthermore, in respect to class B products, mills and foundries have been authorized to fill orders for aluminum up to 30 per cent of a manufacturer's request for his second quarter allotment.

Amended M-1-I order establishes these controls, which are to become effective March 31:

1. High-grade aluminum may be used, without application for permission, only for certain specific purposes, among them combat end items, aircraft, alloys with other metals, and for additional listed purposes.

2. In a separate list of items, only low-grade aluminum may be used. Further, low-grade aluminum is permitted only for items on this list and in items for which high-grade aluminum is permitted.

3. Persons desiring specific permission to use aluminum for purposes not otherwise authorized by the order must apply by letter to the aluminum and magnesium division giving full details of the projected use and the CMP allotment number, if any.

New Schedules for Machine Tool Deliveries Established

A new method of scheduling machine tool deliveries is established by General Preference Order E-1-b as amended by the War Production Board.

The amended order outlines the method in technical detail; its changes are confined to the scheduling of deliveries on purchase orders from "service purchasers" as defined in the order.

Seventy-five per cent of the total production of machine tools is set apart for delivery to service purchasers as in the original order. Seven service groups are named. Each service group's quota is arrived at on the basis of the ratio of each group's backlog of purchase orders to the total backlog for all service groups.

Backlogs are measured at certain specified dates; and purchase orders cannot be considered unless they bear preference ratings of A-10 or higher.

Under the amended order deliveries of machine tools are determined on the basis of backlogs, of urgency standing of each contractor and of required delivery dates of orders for specified sizes and types.

The term "machine tools" means any non-portable, power driven, metal working machine named on List A attached to the order. Existing schedules are frozen until May 1, 1943; the new provisions only affect deliveries after that date.

Progress Not Satisfactory, Says SWPC, Appealing to War Agencies

FAILURE of some war procurement agencies to "sell" subcontracting in the greatest volume practicable to their prime contractors was the subject of identical letters recently addressed by Col. Robert W. Johnson, chairman, Smaller War Plants Corp., to the secretaries of War, Navy, the chairman of the Maritime Commission and director of Treasury Procurement. Attached to the letter was a list of 252 large corporations "which have the preponderance of war contracts to date", with the dollar volume of contracts they hold.

Colonel Johnson reminded the services that, under the provisions of the Smaller War Plants Act, it was his duty to take "appropriate action to bring about subcontracting upon fair and equitable terms in the greatest volume practicable." He referred to a memorandum dated Dec. 15, 1942, signed jointly by Under Secretaries Patterson and Forrestal and Chairman Nelson which was sent to prime contractors urging an extension of subcontracting. "Field reports", he added "fail to indicate any effective response".

"In order to carry out the Congressional mandate, we must know how effective subcontracting methods are," Colonel Johnson's letter stated. It went on to request a report to the Smaller War Plants Corp. which will show, as of March 1, 1943, for the corporations listed: (a) the number and dollar value of prime and subcontracts; (b) the methods being used by the corporations to increase subcontracting, and (c) methods used to insure that subcontracting is being done on a fair and equitable basis.

"I am well aware some of the services have succeeded in getting prime contractors to spread the work and that some contractors have set up adequate reporting systems so that the information requested will be readily obtainable," the letter said. "However, I feel certain others have not accomplished this so effectively."

Colonel Johnson closed the letter with the request that the report be furnished to SWPC not later than April 7, 1943, "in order to incorporate this information in the next report to Congress," which must be delivered by April 11 according to the provisions of the Smaller War Plants Act requiring a bimonthly report.

Preference ratings on projects totaling $18,656,613 were revoked during the week ended March 5, the War Production Board announced last week. Construction was curtailed on school facilities, communications, and petroleum products because they were not directly related to the war effort.

Total cost of projects halted since Oct. 23, 1942, is $1,325,009,008. The action was ordered by the Facility Review Committee.

ODT Appeals to Shippers for Co-operation in Cleaning Cars

In an effort to speed up movement of war materials and more fully utilize existing freight cars, Joseph B. Eastman, director of Defense Transportation, appealed last week through a letter to shippers to remove dunnage, nails, strapping, and other debris from cars in order to permit immediate reloading.

The nation-wide appeal was made to the Regional Transportation Advisory Committees, ODT, in major cities. Mr. Eastman paid tribute to the work done by the Shippers Advisory Boards and other shippers' organizations but he pointed out that there are opportunities for further co-operation in the conservation program.

A recent survey reveals that as many as 20,000 cars are handled over the cleaning tracks in one month. Mr. Eastman said that the practice of leaving cars unfit for loading is inconsistent with the effort to conserve equipment since it takes from three to five days for a freight car to be placed back into industrial use.

Produced Shells at Rate of 50-a-Minute in February

America produced 1,932,000 high explosive shells of all calibers in February, according to the War Department. This is at a rate of 50 shells a minute, day and night, for the 28 days. In the same period shops and arsenals produced 419,000 bombs in all sizes up to block busters, enough to drop 15,000 a night on enemy ships and cities. The U. S. made 8000 cannon for aircraft and 2000 anti-aircraft guns.

Industry hung up a new record for small arms ammunition last month with a total of 1,244,000,000 cartridges in calibers .30, .45 and .50. This is at a rate of more than 500 cartridges a second for every second in the month. In January and February shops produced 150,000 machine guns and 134,000 sub-machine guns, against 132,000 machine guns of all calibers in all of the World War. In these months 5000 tanks, over 28,000 army trucks, 2000 anti-tank guns and 5,000,000 pairs of marching shoes were turned out. In February alone 7800 weapon-bearing combat vehicles were manufactured.

1,239,200 Tons of Merchant Ships Delivered in February

Surpassing all previous ship construction records, American shipyards during February delivered into service 130 new ships totaling approximately 1,239,200 deadweight tons. This brings the total number of vessels constructed thus far in 1943 to 233, totaling 2,247,600 deadweight tons. Number of ships delivered during January and February exceeds the number delivered during the first six months of 1942.

Of the 130 ships delivered, 81 were Liberty ships, 15 C-type cargo, nine tankers, 23 special types, one concrete barge and one coastal cargo ship.

West Coast yards still maintained the lead in the production of deadweight tonnage, delivering 52 per cent of the country's February production. East Coast yards accounted for 36 per cent, while the Gulf and the Great Lakes contributed 11 per cent and 23 per cent respectively.

Suggests Retreading Floor Plates To Save Steel, Time

Suggestion that floor plates, machine pedals and similar non-slip steel surfaces be retreaded by welding instead of being replaced when the tread wears off has been commended by the War Production Board. The proposal was advanced by F. Honerkamp, Anemostat Corp. of America, New York.

Mr. Honerkamp pointed out that many tons of steel and many man-hours of labor could be saved if the non-skid projections were arc-welded to present plates. A welding electrode of mild impact and heavy abrasion quality "should fill the bill in every way."

Howard Coonley, director, WPB Conservation Division, said the suggestion should have many practical applications immediately. Present indicated supply situation in welding electrodes justifies such use, according to WPB officials.

Largest number of steel erecting cranes and crews ever brought together on one construction project are being assembled at the $150,000,000 Geneva steel plant near Provo, Utah, the Columbia Steel Co., U. S. Steel subsidiary, reports.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summary of orders and regulations issued by WPB and OPA, supplementary to Priorities-Allocations-Prices Guide as published in Section II of STEEL, Dec. 14, 1942

E ORDERS

E-9: Precision Measuring Instruments, Testing Machines, effective March 10. Restricts sales of specified precision measuring instruments and testing machines to orders assigned ratings of A-1-a or higher by specified certificates. The order covers balancing machines, bench centers, comparators, gaging machines and other types of devices listed in Schedule A having a retail price of $200 or more. Freezes delivery schedules for 60 days prior to scheduled delivery unless otherwise directed by WPB. Supersedes E-5 and E-1-b with respect to items named in Schedule A.

E-1-b (Amendment): **Machine Tools,** issued March 10. Sets up new method of scheduling machine tool deliveries; freezes existing schedules until May 1. Provides that 75 per cent of total production of machine tools be set apart for delivery to specified service purchasers. Deliveries are determined on basis of backlogs, of urgency of standing of each contractor and of required delivery dates of orders for specified sizes and types.

L ORDERS

L-42 (Amendment): **Plumbing and Heating Products,** effective March 3. Permits wider use of gray cast iron and malleable iron in pipe flanges. Lists sizes of pipe flanges in which gray cast or malleable iron is permitted. Allows malleable-iron screwed flanges, blind flanges, reducing screwed flanges, and lap-joint flanges in the pipe sizes listed. Permits gray cast lap-joint flanges in additional pipe sizes.

L-23-b (Amendment): **Domestic Cooking Appliances,** effective March 6. Requires clearance through WPB on form PD-556 of transfer of new electric ranges remaining in the stocks of manufacturers and distributors. Sets up new procedure for consumers' procurement of repair parts. Limits production of parts to those listed in the order, including heating units, thermostats, switches, relays, lead-in-wires, connecting wires, handles and hinges. Completely bans production of domestic electric ranges, including that to fill previously eligible high ratings.

L-64 (Amendment): **Burial Equipment,** effective March 3. Restricts use of metal in production of caskets and burial vaults to three pounds per unit. Limits use of iron and steel for reinforcing in concrete vaults to 15 pounds in vault of six or more sections; 10 pounds in those of less than six sections. Requires certification when purchasing metal liners to meet government or Army-Navy requirements.

L-106 (Amendment): **Copper Use in Motor Vehicles,** effective March 10. Prohibits use of copper and copper-base alloy products in manufacture of automotive parts, including replacement parts, except 15 specified items, and then only to extent indicated. Provisions and restrictions do not apply to parts produced for the Army or Navy where specifications of the prime contract call for the use of copper or copper-base alloy products.

L-134 (Amendment): **Power, Steam and Water Auxiliary Equipment,** effective March 1. Revokes Schedule III which restricted use of metals in manufacture of feed water heaters. Control now exercised through provisions of order L-172.

L-170 (Amendment): **Farm Machinery,** effective March 6. Permits production of slightly less than double the amount of farm machinery allowed under original terms of the order. Excludes water storage tanks from all limitations of L-170 as amended.

L-254: Air-Cooled Engines, effective March 15. Limits number of engine models which will be produced and establishes standardization and simplification practices. Prohibits manufacture or assembly of any air-cooled engines not listed in schedule A attached to the order. Exempts engines for aircraft and motorcycle propulsion as well as the following: completion of contracts entered into prior to March 15; use of parts which are processed to a point where other use is impracticable; manufacture of engine parts for repair and maintenance.

M ORDERS

M-9-a (Amendment): **Copper,** effective March 4. Places control of warehouse sales of brass and wire mill products entirely under CMP Regulation No. 4. Warehouses are permitted to fill authorized controlled materials orders, or orders bearing preference ratings of AA-5 or higher for 500 pounds or less of any item to any one destination at any one time. No more than 2000 pounds of any one item may be delivered to a customer during a calendar month.

M-21-b (Amendment:): **Iron and Steel Warehouses,** effective March 6. Permits those warehouses which were unable to maintain inventories because of inadequate receipts during 1942 to accept deliveries of any product classification until March 31, provided that the deliveries in excess of quotas do not exceed the deficiency on all product classifications for 1942. Defines "minimum carload" as one weighing not less than 40,000 pounds. Increases plate quotas from 100 per cent to 135 per cent of the base tonnage in the states of California, Oregon, and Washington; from 100 per cent to 125 per cent in all other states. Eliminates from the order quotas for wire rods. Permits warehouses purchasing "seconds" to obtain their quotas from any producer.

M-39 (Amendment): **Cobalt,** effective March 9. Places cobalt on a straight allocation basis, delivery being permitted only on specific WPB authorization. Persons desiring an allocation must file PD-581 and 582, as revised, with WPB. Exempts deliveries of 25 pounds of contained cobalt to any one person in any one month and deliveries of any amount to subsidiaries of the Reconstruction Finance Corp.

M-112 (Amendment): **Antimony,** effective March 8. Removes limitations on use of antimony in production of automotive batteries and alloys. Permits unallocated deliveries to individual customers up to a total of 2240 pounds, or one long ton, in each monthly period. Eliminates ban on use of antimony for manufacture of white pigments, opacifiers, or frits for non-acid-resisting ceramic enamels.

M-227 (Amendment): **Copper Chemicals,** effective March 5. Places allocations of copper chemicals on a quarterly instead of a monthly basis. Application for authorization to accept delivery of copper chemicals must be filed on form PD-600. Application for authorization to make delivery must be filed on PD-601 by the tenth of the last month preceding the quarter in which delivery is planned.

M-9-b (Amendment): **Copper and Copper-Base Alloy Scrap,** effective March 10. Prohibits dealers accepting copper material as scrap from disposing of it in any other form except with specific permission of WPB.

PRICE REGULATIONS

No. 125 (Amendment): **Nonferrous Castings,** effective March 1. Postpones to April 1 the date on which nonferrous casting sellers must stop billing purchasers at higher prices specified in earlier contracts.

No. 244 (Amendment): **Gray Iron Castings,** effective March 13. Specifies following conditions under which a seller of gray iron castings may apply for adjustment of his maximum prices for castings. He must be prepared to show that his maximum prices for the castings are below their production costs, or are inadequate to justify their continued production; and that castings are necessary to the war effort; and either that the seller has entered into or proposes to enter into government contracts or subcontracts under government contracts for sale of the castings; or that unless adjustment is granted he will stop or will refuse to undertake production of the castings, and that as a result the purchaser would be handicapped in his operations for certain specific reasons.

CMP REGULATIONS

No. 4 (Wire Mill Direction No. 1), issued March 8. Enables warehouses distributing brass and wire products to make certain sales in commercial units weighing more than 500 pounds. Following deliveries in excess of 500 pounds of any item, to any one destination, at any one time may be made prior to April 1: wire and cable, sizes 4/0 and larger in full reels not exceeding 1000 feet each; condenser tubes; a single straight length of rod, tube, pipe, sheet or strip; welding rod. Orders for any of the foregoing must be accompanied by, or endorsed with, the appropriate form of certification, and the 2000 pound quarterly limitation on deliveries will continue in effect. Warehouses may apply to WPB for authority to make, and for the purchaser to accept, deliveries of other brass and wire mill products in quantities exceeding those listed in CMP No. 4.

No. 7—Optional Form of Certification, issued March 2. Provides single standard form of certification which may be used to validate any delivery under the Controlled Materials Plan.

More Restrictions Placed on Casket, Vault Manufacture

New restrictions on sizes and designs of caskets and burial vaults, have been ordered by WPB. Restrictions will reduce the use of metal from 4 to 3 pounds per unit and result in an additional annual saving of 675 tons of iron and steel.

Use of iron and steel for reinforcing in concrete vaults, prohibited as of Dec. 30, is again permitted on a restricted basis until April 30. Restrictions limit such use to 15 pounds in a concrete vault of six or more sections, and 10 pounds in those of less than six sections.

Restrictions against the use of metal liners are continued with the additional provision that certification is required when purchasing metal liners to meet government or Army-Navy requirements.

Through its present provisions, L-64 is affecting a total annual saving in critical metals of 67,000 tons of iron and steel, 800 tons of zinc, 650 tons of copper and 1700 tons of antimonial lead.

War Production Board stated last week that it had seized approximately 600,000 pounds of nonferrous metal, mainly copper scrap, from A. B. Alpirn Co., Omaha, Nebr. The supply is believed one of the largest copper scrap concentrations in the country.

WINDOWS of WASHINGTON

Bibliography of helpful postwar planning literature presented by National Planning Association outlines methods by which government may create and maintain full employment and high productivity

NEXT to the problem of winning the war the most important has to do with postwar economy. Two important questions most individuals are asking are: "Will I be in business after the war?" and "Will I have a job after the war?" Hence this department, over the past seven weeks, has been given over to a summation and analysis of the main feature or postwar planning which, as previously has been made plain, is aimed at creating and maintaining full employment and high productivity, and also at prevention of alternate booms and depressions.

It is important that business men and men in industry familiarize themselves with ideas advanced by planners. Many business men who have heard radio broadcasts and read newspaper and magazine articles have the impression that much of the planning is of an impractical, dreamy character. Careful study of the blueprint, however, reveals that it has a vast amount of merit. It should receive the thorough attention it deserves—for everybody involved freely admits that if we do go into the postwar period without plans, we will be inviting economic chaos.

Each Item Described

So its readers may conveniently select postwar planning literature of particular interest to them STEEL, herewith, sets forth a bibliography on postwar planning. As will be seen, an attempt has been made to describe each item sufficiently to enable the reader to get a good idea of the nature of the subject matter. The bibliography was prepared by the National Planning Association, to which STEEL acknowledges its indebtedness.

Many readers who have followed this discussion over the past seven weeks have asked questions that indicate their doubts as to the complete practicality of the overall postwar planning as so far developed. In particular, they have questioned the possibility of utilizing private industry merely for full employment and high productivity while at the same time it must operate within a rigid framework of fixed prices and fixed wages and of severe profit limitations. It appears true that postwar plans as now formulated are weak in these important phases. The apparent weakness of the blueprint will be discussed here in next week's issue.

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A SPECIAL REPORT TO INDUSTRY

POSTWAR PLANNING

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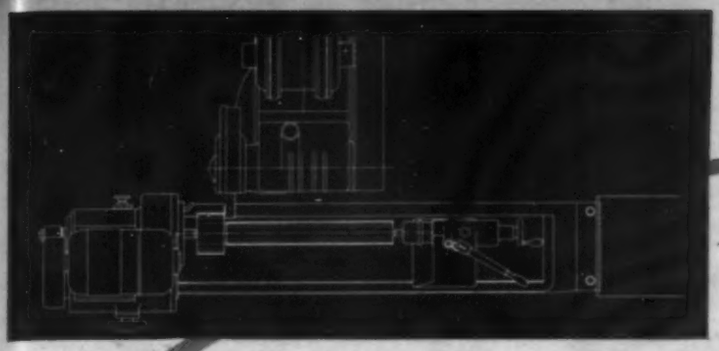

Conventional cylindrical grinding set-up, followed by grinding the shoulder.

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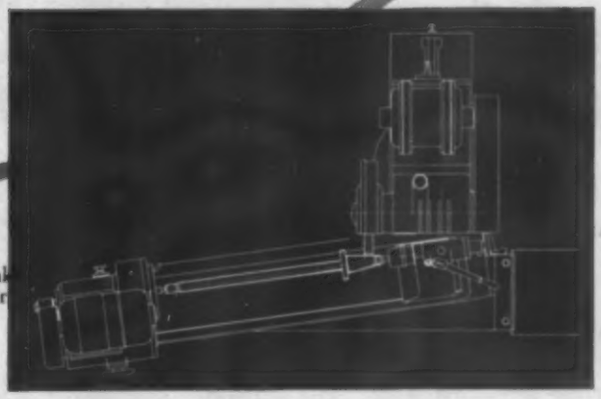

Set-up for grinding taper shank end of a milling machine arbor

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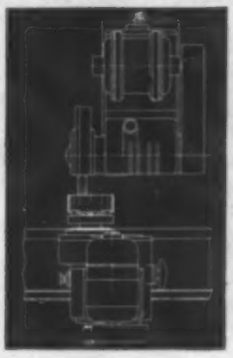

Left: Rotary surface grinding a part held in the standard chuck.

Above: Grinding the bore of a sleeve.

Above: CINCINNATI 12″ x 24″ Hydraulic Universal Grinding Machine.

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McDONALD, BRIG. GEN. H. F. "Veterans of the Present War." Address before Montreal Rotary Club. Nov., 1941. 19pp. Free from Director of Public Information, Ottawa.

MEADE, JAMES EDWARD. "The Economic Basis of a Durable Peace." New York: Oxford University Press. 1940. 192pp. $2.

MEDICAL CARE (Williams & Wilkins Co., Baltimore). $3 a year; $1 a copy.
Nov., 1942. "British Medical Planning, with a Symposium of American Comment."

MODERN INDUSTRY (347 Madison avenue, New York). $2 a year; 25 cents a copy.
Dec., 1942. "Modern Industry Looks Ahead;" "The Postwar Challenge to Industry;" etc.
Nov. 15, 1941. "Industrial World Tomorrow."

MOODY, BLAIR. "Boom or Bust." New York: Duell, Sloan & Pearce. 1941. 336pp. $2.50.

NATIONAL ASSOCIATION OF MANUFACTURERS (14 W. Forty-ninth street, New York).
"Can We Avoid a Post-Armament Depression? A Survey of Opinions submitted by members of the American Economic Association. June, 1941. 72pp. Free.
"National Defense and America's Future: A Program Adopted by the 48th Congress of American Industry." Dec., 1941. 11pp. Free.
"Preparing Now for Postwar Problems." Report of the Committee on Postwar Problems. July, 1942. 10pp. Free.

NATIONAL CONFERENCE ON PLANNING, 1942. "Proceedings." Chicago: American Society of Planning Officials, 1313 E. Sixtieth street, 1942. 228pp. $2.50.

NATIONAL COUNCIL FOR THE PREVENTION OF WAR (1013 Eighteenth street, N.W., Washington).
"Leaflets on the Postwar World." Series. Mimeo. 1942. 10 cents each.
1. Beyond War, 20pp.
2. Sovereignty and the Four Freedoms, 12pp.
3. Tariffs and the Atlantic Charter, 20pp.
4. Race Prejudice and World War, 20pp.
5. Equal Access to Raw Materials, 19pp.
6. The People's Peace, 12pp.

NATIONAL HOUSING ADMINISTRATION, Washington.
"Bibliography on Postwar Housing and Urban Development." Sept., 1942. 8pp. Mimeo. Free.
"A Handbook on Urban Redevelopment for Cities in the United States." By the Federal Housing Administration. 1941. 105pp. 15 cents.

NATIONAL PEACE COUNCIL (144 Southampton Row, London, W. C. 1.—U. S. distributor, The American Friends Service Committee, 20 S. Twelfth street, Philadelphia).
"Peace and Reconstruction Yearbook, 1942." 70pp. 25 cents.
"Peace Aims Pamphlets." 25 cents each.
10. The British Commonwealth and the United States in the Postwar World (Collected Speeches), 64pp.
11. Freedom for Colonial Peoples, 38pp.
12. Britain and Russia: The Future. 62pp.
13. Food Relief for Occupied Europe, 24pp.
14. India, 1939-1942, 30pp.

NATIONAL PLANNING ASSOCIATION (800 Twenty-first street, N.W. Washington).
"Plan." 6-page leaflet describing work of the Association and classes of membership. Free.
"German Strategy of World Conquest," by Derwent Whittlesey, in collaboration with C. C. Colby and Richard S. Hartshorne. New York: Farrar and Rinehart. 1942. 293pp. $2.50. (Special price of $1.85 to subscribers and members of the Association).
Planning Pamphlets, series—at least 10 a year. Joint subscription with **Public Policy Digest** (see below) $5 a year. 25 cents a copy.
2. War and Our Latin American Trade Policy, 1939, 36pp.
5. Defense Planning and Labor Policy, 1941, 24pp.
7. The Crisis in Transportation, 1941, 26pp.
8. Guides for Postwar Planning, 1941, 31pp.
9. Britain's Trade in the Postwar World, 1941, 36pp.
10. Urban Redevelopment and Housing, 1941, 24pp.
11. For a Better Postwar Agriculture, 1942, 47pp.
12. & 13. The Postwar Industrialization of China, 1942, 92pp.
14. When Demobilization Day Comes, 1942, 35pp.
15. International Development Loans, 1942, 38pp.
16. Regional Resources Development (U. S.), 1942, 40pp.
17. Relief for Europe, 1942, 59pp.
18. Economic Pattern of World Population, 1943, 54pp.
The Postwar Debt Problem (In Process).
Full Employment Wage and Price policy (In Process).
Special Reserves for Postwar Industrial Reconversion (In Process).
Public Policy Digest, monthly except for July and August. Joint subscription with **Planning Pamphlet Series** (see above), $5 a year. 25 cents a copy. Reviews current reports and activities of government and private agencies, giving special attention to war and postwar planning; provides order service at no extra charge to subscribers. Feb., 1940 and subsequent issues.

NATIONAL POLICY COMMITTEE (National

Press Bldg., Washington).
"Steps Toward a Durable Peace." Memo. No. 9, 1940. 28pp. 50 cents.
"What We Are Fighting For." Memo. No. 14, 1941. 31pp. 50 cents.

NEVINS, ALLAN. "America in World Affairs." New York: Oxford University Press. 1942. 140pp. $1.

NEW EUROPE AND WORLD RECONSTRUCTION. (151 E. Sixty-seventh street, New York). $2.50 a year; 25 cents a copy. (Regularly includes insert containing Survey of Central and Eastern Europe by the Central and Eastern Planning Board). This monthly review of international affairs gives special attention to plans which have been put forward by prominent Europeans-in-Exile.

NEW YORK CITY PLANNING COMMISSION (Municipal Bldg., New York).
"Proposed Postwar Works Program, the City of New York." Oct., 1942. 32pp. and map. 25 cents.

OBERLIN COLLEGE, Series of Lectures. "Toward International Organization." New York: Harper & Brothers. 1942. 217pp. $2.

OFFICE OF PRICE ADMINISTRATION (Washington).
"A Plan for Installment Selling for Postwar Delivery." By Rolf Nugent. Dec., 1942. 120pp. Mimeo. Free.
"War and Postwar Food Policies," address by H. R. Tolley before a joint meeting of the National American Wholesale Grocers Association and the National Association of Retail Grocers at Chicago, June 8, 1942. 7pp. Mimeo. Free.

OFFICE OF WAR INFORMATION (Washington).
"Postwar Planning Activities of the Federal Government." Nov., 1942. 27pp. Free.
"Toward New Horizons—The World Beyond the War." Speeches and Statements of Henry Wallace, Sumner Welles, John Winant and Milo Perkins. 1942. 16pp. Free.

OLSEN, O. E. W. "Postwar Housing Problems: based on League of Nations and International Labour Organization Data." New York: Columbia University Press. 1940. 69pp. 40 cents.

ORR, SIR JOHN. "Fighting for What?" London: Macmillan Co. 1942. 89pp. 2s. 6d.

PACKARD, WALTER. "The Economic Implications of the Central Valley Project." Los Angeles: Adcraft, 3440 S. Hope street, 1942. 91pp. 25 cents.

PAN AMERICAN UNION (Washington).
"Report of the Third Meeting of the Ministers of Foreign Affairs of the American Republics in Rio de Janeiro, Jan. 15-28, 1942." 60pp. 15 cents from Pan American Union.
"Preliminary Recommendation on Postwar Problems," formulated by the Inter-American Juridicial Committee and submitted to the Governments of the American Republics by the Governing Board of the Pan American Union. Nov., 1942. 27pp. 10 cents from the Union.

PEOPLES MANDATE COMMITTEE (Hay-Adams House, Washington).
"The Americas and the Postwar World," by Florence Brewer Boeckel. 1942. 16pp. 25 cents.

PLANNING AND CIVIC COMMENT (American Planning and Civic Assn., 901 Union Trust Bldg., Washington). $3 a year.
Oct., 1942. "The Status of Planning for Postwar Urban Redevelopment," by Charles T. Stewart.

POLITICAL AND ECONOMIC PLANNING (16 Queen Anne's Gate, London, S. W. 1. U. S. Distributor, **The New Republic,** 40 E. Forty-ninth street, New York. $4.50 a year; 25 cents a single copy, unless otherwise specified).
Planning
Oct. 13, 1942. "Planning for Holidays." 15pp.
Sept. 22, 1942. "Outlook for France." 16pp.
July 14, 1943. "Planning for Social Security." 52pp. 50 cents.
April 21, 1942. "An Anglo-American Economic Policy." 15pp.
April 7, 1942. "British Reconstruction Agencies." 20pp.
Jan. 20, 1942. "The Future of the Colonies." 20pp.
Dec. 30, 1941. "Building for the Nation." 16pp.
Nov. 25, 1941. "National Policy Towards the Land." 16pp.
Nov. 4, 1941. "Publicly Owned Land." 20pp.
Sept. 2, 1941. "Planning Postwar Industry." 15pp.

THE PRODUCERS' COUNCIL INC. (815 Fifteenth street, N.W., Washington).
"Postwar Planning for the Construction Industry." June 1942. 26pp. Single copies free; additional copies 10 cents each.

RESEARCH INSTITUTE ON PEACE AND POST-WAR PROBLEMS, AMERICAN JEWISH COMMITTEE (386 Fourth avenue, New York).
"Governments-in-Exile on Jewish Rights," edited by Abraham G. Duker. 1942. 64pp. 25 cents.

ROYAL INSTITUTE OF INTERNATIONAL AFFAIRS (Chatham House, London).
Bulletin of International Affairs. 25s. a year; 1s. a copy.
"Industrialization Overseas"—1. Background and Tendencies, May 30, 1942; 2. Resources and Comparative Costs, (Also: "India's Progress in Industrialization"), June 13, 1942. 3. National Capabilities, June 27, 1942.
"Medical Relief in Europe, Questions for Immediate Study," by Melville D. MacKenzie. 1942. 67pp. 70 cents from Oxford University Press, New York.
"Relief and Reconstruction in Europe: The First Steps." July, 1942. 40pp. 50 cents from Oxford University Press, New York.

SHEPARDSON, WHITNEY H. "The Interests of the United States as a World Power." Claremont, Calif.: Claremont Colleges. 1942. 64pp. $1.75.

SOCIAL RESEARCH (66 W. Twelfth street, New York). $3 a year; 75 cents a copy.
Nov., 1942 "Plans for a Postwar World Clearing Bank," by Hubert Ladenburg.
Sept., 1942. "World Oil Control, Past and Future—An Alternative to 'International Cartelization'," by Frederick Haussmann.
May, 1942. "The Coming Organization for Peace," by Alvin Johnson.
Sept., 1941. "War Aims and America's Aims," by Max Ascoli; "The United States and World Reconstruction," by Hans Staudinger; "Sovereignty and the Coming Peace," by Fernando de los Rios; "Internal Structure and International Order," by Nino Levi.

STEAD, WILLIAM H. "Democracy against Unemployment." New York: Harper and Brothers. 1942. 280pp. $3.

STRAIGHT, MICHAEL. "Make This the Last War." New York: Harcourt, Brace and Co. 1943. 417pp. $3.

TENNESSEE VALLEY AUTHORITY (Knoxville, Tenn.).
"Toward a Solution of Postwar Problems." Address by James M. Pope, before the Southern Institute of Local Government, Nov. 14, 1942. 12pp. Mimeo. Free.

THE TIMES (London) September 10, 1941, p. 5. "Summary and Review of **Europas Wirtschaftsfreiheit** (Europe's Economic Freedom)," a booklet by Werner Daitz, presenting Nazi demands.
Nov. 29, 1941, p. 5. "Industry After the War—Public Policy and Private Enterprise."

TOMPKINS, DOROTHY C. "Social and Economic Problems Arising Out of World War II." A Bibliography. Chicago: Public Administration Service, 1313 E. Sixtieth street, 1941. 114pp. $1.50.

TORPATS, JOHN. "Economic Basis for World Peace." New York: John Felsburg. 1941. 222pp. $3.

TWENTIETH CENTURY FUND (330 W. Forty-second street, New York).
"Postwar Planning in the United States." by George B. Galloway. 1942. 158pp. 60 cents. (Revision in process).
"When the War Ends," series by Stuart Chase.
1. "The Road We Are Traveling, 1914-1942." 1942. 106pp. $1.
2. "Goals for America: A Budget of Our Needs and Resources." 1942. 134pp. $1.
Parts 3 through 6 in preparation.

UNITED NATIONS INFORMATION COMMITTEE—former Inter-Allied Information Committee (610 Fifth avenue, New York).
Inter-Allied Review. 10 cents a copy; free subscriptions upon application to Committee. Monthly Summary of Documents on the Allied Struggle for Freedom. Jan. 1941 and subsequent issues.
"Research and Postwar Planning, Bibliography." 1942. Part 1, $1; 2, 65 cents; 3, 60 cents; 4, 90 cents and 5, 80 cents.
"Research and Postwar Planning, Survey of Agencies." 1942. Part 1, 85 cents; 2, 65 cents; 3, 60 cents; 4, 70 cents; and 5, 65 cents.

UNITED STATES DEPARTMENT OF AGRICULTURE (Washington).
Foreign Agriculture. $1 a year; 10 cents a copy.
Sept., 1942. "International Agreements for the Control of Farm Surpluses," by Leslie A. Wheeler.
January, 1942. "Wartime Agriculture and Postwar Objectives," by Montell Ogdon.
"International Wheat Agreement and Related Documents." 1942. 32pp. Free.
Land Policy Review, 30 cents a year; 10 cents a copy.
Winter, 1942. "Train Them Now for Service Later," by Eric Englund.
March, 1942. "Postwar Problems," by John J. Haggerty.
April, 1942. "The Postwar High Plains," by Karl S. Landstrom.
July, 1941. "When Peace Comes: Planning for Postwar Agriculture." Sept., Oct., and Nov., 1941 issues contain letters of reply to the editor giving opinions on postwar agriculture.
"Post Defense Planning." Memorandum No. 913, establishing Interbureau Co-ordinating Committee on Post-Defense Programs. Office of the Secretary. May 13, 1941. 2pp. Mimeo. Free.
Supplement 1, Memorandum No. 913. "Outlining Organization and Program." Sept. 17, 1941. 8pp. Processed. Free.
Postwar Plans. 1942. Free.
1. "An Introduction, Why We Must Plan for Peace." 5pp. 2 and 3. "Agricultural-Industrial Relations." 6pp. and 10pp.
"Topical Outline for State Plan for Land-Resource Conservation and Development." March 18, 1942. 28pp. Mimeo. Free.

UNITED STATES DEPARTMENT OF COMMERCE, Bureau of Foreign and Domestic Commerce (Washington).
"The Building Construction Industry and our Postwar National Economy," address by S. Morris Livingston before the Chicago Building Congress, Oct. 22, 1942. 9pp. Mimeo. Free.
"Discussion of Prospects for and Problems of Business in the Postwar Period," by Arthur R. Upgren at a New Hampshire Bank Management Conference in Hanover, June 5, 1942. 7pp. Mimeo. Free.
Foreign Commerece Weekly. $4.50 a year; 10 cents a copy.
Oct. 31, 1942. "Transportation—Key to Future Trade," by Wayne Chatfield Taylor.
May 10, 1941. "Germany's Plans for Postwar Economy: Their Scope and Implications," by Louis Domeratsky.
"Postwar Planning Will Win the Peace," address by Arthur R. Upgren, at convention of American Marketing Association, Ann Arbor, June 13, 1942. Mimeo. Free.
"References on Defense, War and Economic Effects of War," by Gladys A. West. Aug., 1941. 28pp. Mimeo. Free.
"Small Town Manual: Part 1—How You Can Win the War at Home; Part 2—How You Can Improve Business in Your Town." 1942. 81pp. Processed. Free.
"Survey of Business Research Projects at Universities." (Postwar Problems, see

pp. 123-126). 1942. 188pp. Free.

UNITED STATES OFFICE OF EDUCATION (Washington).

Education for Victory, $1 a year; 5 cents a copy. Reports on war and postwar activities in schools and in federal agencies dealing with education.

"Planning Schools for Tomorrow," by John Guy Fowlkes. 1942. 26pp. 10 cents.

UNITED STATES DEPARTMENT OF LABOR, Bureau of Labor Statistics (Washington).

"Historical Studies of War and Postwar Problems."

51. "Canned Foods, Withdrawal of the Government from the Market," by Stella Stewart and J. Donald Edwards. August, 1942. 39pp. Free.

52. "The Automobile Industry, Postwar Developments, 1918-21," by Irving Bernstein. Sept., 1942. 88pp. Free.

"Select Bibliography on Postwar Problems, Especially on Means of Maintaining Employment in the Postwar Period." June, 1942. 5pp. Mimeo. Free.

UNITED STATES NATIONAL RESOURCES PLANNING BOARD (Washington).

"Area Analysis—A Method of Public Works Planning." July, 1942. 31pp. 15 cents.

"Development of Resources and Stabilization of Employment in the United States." 1941. Part 1, The Federal Program for National Development, 100pp. 25 cents. Part 2, Regional Development Programs, 285pp. 85 cents. Part 3, Functional Development Policies, 59pp. 15 cents.

"International Economic Development—Public Works and Other Problems," by Lewis L. Lorwin. 1942. 111pp. 30 cents.

"Long Range Programming of Municipal Public Works," 1941. 72pp. 30 cents.

National Resources Development, Report for 1942. 227pp. 55 cents.

Planning Now, published at irregular intervals. Resume of postwar activities in public and private agencies. Nov., 1942 and Dec., 1942 issues available. Mimeo. Free mailing list.

Postwar Pamphlet Series.

"After Defense—What?" 1941. 16pp. 5 cents.

"After the War—Full Employment," by Alvin H. Hansen. Jan., 1942. 19pp. 5 cents.

"Better Cities: Building America," by Charles S. Ascher. April, 1942. 22pp. 5 cents.

"The Role of the Housebuilding Industry: Building America," by Miles L. Colean. July, 1942. 29pp. 5 cents.

"Future of Transportation." Sept., 1942. 43pp. 10 cents.

"Postwar Planning." Sept., 1942. 32pp. 10 cents.

"Postwar Agenda." Chart, 19 x 24. Nov., 1942. 5 cents.

"Postwar Planning, a Bibliography," by Letha F. McCance. Jan., 1942. 41pp. Mimeo. Free.

UNITED STATES DEPARTMENT OF STATE (Washington).

Department of State Bulletin. $2.75 a year; 10 cents a copy.

Dec. 5, 1942. "Agreement with Canada Regarding Postwar Economic Settlements."

Oct. 10, 1942. "Address by Sumner Welles before the 29th National Foreign Trade Convention." Address by Raymond H. Geist before the Conference on "Some Economic Aspects of our Foreign Relations." Address By Harry C. Hawkins before the Conference on "British-American Trade Relations After the War."

March 7, 1942. "Address by Leo Pasvolsky before a Conference of the Commission to Study the Bases of a Just and Durable Peace."

May 30, 1942. "America's World Role." Memorial Day Address, by Sumner Welles.

UNITED STATES TARIFF COMMISSION (Washington).

"Latin America as a Source of Strategic and Other Essential Materials." Report No. 144. 1941. 397pp. 50 cents.

UNIVERSITY OF CHICAGO ROUND TABLE WEEKLY (Chicago). $2 a year; 10 cents a copy.

"Series on the Postwar World," beginning

VAN KIRK, WALTER W. "Religion and the World of Tomorrow." New York: Willett, Clark & Co., 1941. 150pp. $1.50.

WALLACE, HENRY A. "America's Part in World Reconstruction." Radio address, Dec. 28, 1942. 13pp. Mimeo. Free from the vice president's office, Washington.

WORLD CITIZEN'S ASSOCIATION (84 Randolph street, Chicago).

"The United Nations: What They Are, What They May Become," by Henri Bonnet. 1942. 100pp. 25 cents.

"The United Nations on the Way," by Henri Bonnet. 1942. 170pp. 50 cents.

"World's Destiny and the United States," Conference Report, 1941. 309pp. $1.

WORLD PEACE FOUNDATION (40 Mt. Vernon street, Boston).

"Dependent Areas in the Postwar World," by Arthur W. Holcombe, 1941. 108pp. 50 cents.

"Eastern Europe and the United States," by Josef Hanc. 1942. 95pp. 25 cents.

"The Netherlands Indies and the United States," by Rupert Emerson. 1942. 92pp. 50 cents.

"Peace Aims and Postwar Planning." Annotated Bibliography, by Fawn M. Brodie. 1942. 53pp. 25 cents.

"The United States and the Far East: Certain Fundamentals of Policy," by Stanley K. Hornbeck. 1942. 100pp. 50 cents.

WRIGHT, CHESTER W., editor of symposium, "Economic Problems of War and Its Aftermath." Chicago: University of Chicago Press. 1942. 197pp. $2.

YOUNG, SIR GEORGE. "Federalism and Freedom or Plan the Peace to Win the War." New York: Oxford University Press. 1941. 204pp. $2.50.

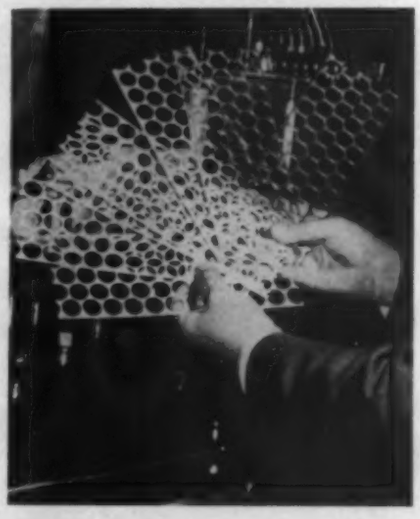
Copper Chemicals Will Be Allocated on Quarterly Basis

Allocations of copper chemicals have been placed on a quarterly instead of a monthly basis by WPB through issuance of General Preference Order M-227, as amended, to enable producers and consumers of these chemicals to plan production and consumption over a longer period with resulting economies in operation.

Copper chemicals are used in agriculture as fungicides and in soil treatment. Industrial uses included electroplating, mining, and production of synthetic rubber, dyes, pigments, wood pulp, paper, pharmaceuticals, textiles, ceramics, glazes and glass. Copper chemicals are defined as copper sulfate, copper carbonate, copper oxide, copper nitrate, copper chloride, and copper cyanide.

Change to the quarterly period is important to producers of these chemicals because, as a result of the shortage of copper, they are not operating at capacity and previously had not known in one month what the next month's permitted production would be. The change also will save time and paper work for the industry and WPB.

PENNIES FROM STEEL



NEW wartime pennies are being struck from steel strip, a conservation measure estimated to save 4600 tons of copper annually. Coated lightly with zinc to prevent rust, the one-cent pieces are white when issued, soon turn black with use, which will help distinguish them from dimes whose size they approximate. NEA photo

Use of Copper for Alloying With Silver Prohibited

Use of copper for alloying with silver has been prohibited since March 1, except on orders rated A-1-a, or higher, or with the specific authorization of the Director General for Operations.

Until March 1, persons using copper for alloying with silver had been permitted to use materials in inventory on Nov. 1.

Search for Tropical Woods To Substitute for Metals

Tropical forests of the Americas to the south are being explored for woods to be used in war industries and as a substitute for steel and other metals, according to a report of Inter-American Affairs office.

Illustrative of the intensified hunt for timber resources is the departure of the United States mission of foresters for Central America, led by Dr. Arthur Bevan, director of the tropical experiment station in Puerto Rico. The mission has gone to Costa Rica, Honduras and Nicaragua in search of wood to replace steel and concrete in the construction of strategic roads in Central America.

Termite-resistant woods found in tropical forests are expected to serve well in bridges, pilings and road culverts. Balsa and other light woods are in demand for aircraft manufacture, shipbuilding and other industries. Use of tropical mahogany is found in the manufacture of planes, torpedo boats, landing boats and gliders.

Production of Additional Farm Equipment Authorized

PRODUCTION of specific items of farm machinery and equipment up to the amounts recommended by Food Administrator Wickard is authorized by Limitation Order L-170 as amended.

Increase was made possible by the recent action of the WPB Requirements Committee which allotted additional critical materials for the manufacture of farm machinery during the second quarter of 1943. The new allotment will permit production of slightly less than double the amount of farm machinery allowed under the original terms of L-170.

Present amended order shows the percentage of increase authorized for 166 items out of the 312 listed in Schedule A attached to the order. Those that are not given an increase under this amendment have received sufficient increases through previous amendments to the original order or through the granting of appeals or other authorization in individual cases. Among other changes made by the present amended order are the following:

1. Producers who previously have been authorized by appeal or otherwise to manufacture additional quantities of any item increased by this amendment must deduct such previously authorized quantities from the increased quotas.

2. Producers granted increases must certify to WPB their intention to manufacture their entire quota including the increases. In cases where the producer will not be able to manufacture his full quota, he must notify WPB, and that part of the quota which he cannot manufacture will be placed with another producer.

3. The expiration date of the entire order L-170 is changed from Oct. 31, 1943, to Sept. 30, 1943, to make it conform to calendar quarters under which allotments of materials are made by the Requirements Committee.

4. Water storage tanks (item 218 in Schedule A of the original order) were eliminated from Schedule A of L-170 as amended Feb. 12, 1943. They are now specifically excluded from the definition of "farm machinery and equipment." This frees water storage tanks from all limitations of L-170 as amended.

Use of PRP Ratings for MRO Supplies Clarified by WPB

Use of Production Requirements Plan ratings authorized for maintenance, repair and operating supplies to purchase cranes, monorails, and similar equipment is the subject of an interpretation of Priorities Regulation No. 11 by WPB.

Provisions of Priorities Regulation No. 11 which cover MRO supplies permit use of assigned ratings to purchase minor items of productive capital equipment but exclude from this definition any item to be used for plant expansion. The interpretation points out that cranes and monorails costing less than $200, intended to replace existing equipment or for minor relocation of plant machinery, may be considered "minor capital equipment" but that those costing more than $500 would not be so considered. Use of the MRO rating for items costing between these two sums must be considered in the light of the size of the plant, the nature of the equipment, and similar factors. In case of doubt, an application for priorities assistance should be made on Form PD-1A.

The interpretation also calls attention to the fact that Priorities Regulation No. 11A provides that Controlled Materials Plan Regulation No. 5 will govern in the case of MRO supplies to be delivered after March 31. As the CMP Regulation sets a limit of $500 on items of productive capital equipment and minor capital additions which may be purchased under its procedures, there may be some items which constitute maintenance, repair, and operating supplies under CMP Regulation No. 5 which do not fall within the definition of these contained in Priorities Regulation No. 11.

Air-Cooled Engine Production Under Limitation Order

Production of all air-cooled engines, except those for aircraft and motorcycle propulsion, is controlled by Limitation Order L-254.

New order limits the number of engine models which will be produced. It also establishes standardization and simplification practices which will materially decrease the number of replacement parts are required by the armed services and essential civilian users.

On and after March 15, the manufacturer or assembly of any air-cooled engines not listed in Schedule A attached to the order is prohibited.

Basic models listed in Schedule A may be manufactured or assembled only when the engine parts used conform to the standard specifications prescribed in Schedule B attached to the order.

Following exceptions are provided:

1. The completion of contracts entered into before March 15.

2. The use of parts which are processed by a point where other use is impracticable.

3. The manufacture of engine parts for repair and maintenance.

Order L-254 controls the manufacture of all air-cooled engines used by the armed forces as well as engines for essential civilian supplies, except those for aircraft and motorcycle propulsion.

Limitations on Antimony Lifted by War Board

Limitations on the use of antimony in production of automotive batteries and alloys were removed and the weight-limit for small deliveries of antimony to any one person was substantially increased under an amended version of General Preference Order M-112. Restrictions previously applied to the antimony content of inorganic pigments, toys, and ornaments remain unchanged.

Unallocated deliveries to individual customers, which have previously been restricted to 25 pounds or less of contained antimony from all sources during any one month, will be permitted in the future up to a total of 2240 pounds, or one long ton, in each monthly period.

No change is made in the 50-ton limit on the permissible antimony content of unallocated ores and concentrates that may be shipped by a producer during any one calendar month from mines located in the United States or Alaska.

Restrictions on Cobalt Eased By Amendment to M-39

Amended order M-39 covering use of cobalt, which will have the effect of relaxing restrictions previously in effect, was issued last week by WPB.

Previously, the use of cobalt—one of the important steel alloys—was prohibited except for eleven purposes listed by the order. It was found that this provision eliminated the use of the metal for many necessary products including certain items required by Army and Navy.

The order as amended places cobalt on a straight allocation basis, deliveries being permitted only on the specific authorization of WPB. Persons desiring an allocation must file Forms PD-581 and 582, as revised, with WPB.

However, deliveries of 25 pounds of contained cobalt to any one person in any one month or deliveries of any amount to subsidiaries of the Reconstruction Finance Corp. may be made without specific authorization.

Applications for Expansions Approved by Defense Plant Corp.

CONTRACTS for new war plant facilities and equipment were authorized last week by Defense Plant Corp. In each case, DPC will retain title to the facilities which will be operated by the contractors. Figures are approximate. Contracts include:

Youngstown Sheet & Tube Co., Youngstown, O., to provide additional plant facilities at a plant in Indiana costing $1,200,000.

St. Louis Smelting & Refining Co., St. Louis, to provide plant facilities in Missouri at a cost of $580,000.

American Iron & Machine Works Co., Oklahoma City, Okla., to provide equipment for a plant in Oklahoma costing $30,000.

American Aviation Corp., Jamestown, N. Y., to provide equipment at a plant in New York at cost of $75,000.

General Motors Corp., Detroit, to provide additional facilities in Indiana at a cost of $350,000, resulting in overall commitment of $1,550,000.

McQuay-Norris Mfg. Co., Connersville, Ind., to provide equipment for a plant in Indiana costing $265,000.

Lion Oil Co., El Dorado, Ark., to provide additional facilities in Arkansas at cost of $325,000 resulting in an overall commitment of $1,365,000.

General Motors Corp., Detroit, to provide additional facilities in Indiana and Michigan at a cost of $3,500,000, resulting in an overall commitment of $63,000,000.

Empire Ordnance Corp., New York, to provide equipment for a plant in Pennsylvania at cost of $475,000.

Bundy Tubing Co., Detroit, to provide additional facilities for a plant in Michigan at a cost of $295,000, resulting in an overall commitment of $1,135,000.

Mercury Motor Transport Inc., New Orleans, to provide automotive equipment for a plant in Louisiana at a cost of $20,000.

Columbia Steel Co., San Francisco, to provide additional facilities at plants in Utah at a cost of $3,300,000, resulting in an overall commitment of $12,500,000.

Branch Motor Express Co., Allentown, Pa., to provide facilities in Pennsylvania at a cost of $120,000.

Westvaco Chlorine Products Co., New York, to provide plant facilities in California costing $230,000.

Taylor Refining Co., Taylor, Tex., to provide plant facilities in Texas costing $1,000,000.

Whitley Products Inc., Columbia City, Ind., to provide machinery and equipment for a plant in Indiana at a cost of $215,000.

Kellett Autogiro Corp., Philadelphia, to provide additional equipment for a plant in Pennsylvania at a cost of $56,000, resulting in an overall commitment of $440,000.

Jensen Machinery Co. Inc., Bloomfield, N. J., to provide additional equipment for plants in New Jersey and California at a cost of $27,000, resulting in an overall commitment of $142,000.

WPB Publication Covers Details of War Effort

Publication of *War Production News* by district offices of the War Production Board provides a clearing house for materials and equipment required or available and for subcontract opportunities by which manufacturers may obtain war work suited to their equipment.

The publication also presents latest information on War Production Board orders, Controlled Materials Plan, priorities and various other matters of importance to those engaged in the war effort.

The publication is free to all interested and may be obtained by application to the nearest WPB district office.

—o—

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The Men and Women of

HYATT BEARINGS DIVISION

General Motors Corporation, Harrison, New Jersey

By A. H. ALLEN *Detroit Editor, STEEL*

MIRRORS of MOTORDOM

Believe subcontracting extended to limit. . . Chrysler has let 58.2 per cent of its two billions in war orders. . . Henry Kaiser reported considering production of $400 postwar automobile

DETROIT

LITTLE of a specific nature has been revealed about the extent of subcontracting in the automotive war production industries. It has been understood generally that subcontracting now is even more widespread than in prewar days, but even as late as a couple of weeks ago, a plan was advanced here to expand aircraft engine assemblies by stepping up the rate of subcontracting. There are some doubts subcontracting can be pushed much further.

Consider the case of Chrysler Corp. Of the more than two billion dollars in war contracts now being handled by this corporation, 58.2 per cent or about $1,300,000,000 is being subcontracted to smaller companies. At the present time, 8079 individual companies located in 856 cities and 39 states share Chrysler war work through subcontracting. Of this group, 4690 are relatively small business concerns, 1607 are medium size and 1782 are large organizations. It does not take much imagination to visualize the problems incident to following through on purchase orders scattered over these eight thousand suppliers.

As further evidence of how widely war work is subcontracted, take the number of piece parts involved in just 21 jobs which Chrysler is building. The total is 32,703 different parts, of which 19,611 are produced by Chrysler subcontractors, and 13,092 by the corporation's own plants.

One of the major contracts, combat tanks, involves 4500 separate parts, out of which 3000 are supplied by outside interests. Of the Bofors gun job's 950 separate parts 522 are furnished by subcontractors. Chrysler-built Martin B-26 bomber sections call for 11,542 parts and 5881 are from the outside. Dodge army trucks have 5101 individual parts and 3783 are obtained from subcontractors. Gyrocompasses have 406 different parts, 303 from suppliers.

Subcontractors also furnish thousands of other items which do not go directly into war products but which are necessary for their manufacture—cutting oils, machinery, tools, dies, fixtures, and the like.

The number of subcontractors which share war work with Chrysler is now more than five times the 1540 which participated in peacetime automotive programs. And in addition to the thousands of companies now working on Chrysler contracts, the corporation has detailed information on another 3000—lists of machinery, quality standards and performance ability—on master card records which permit buyers to select quickly when new sources are needed.

During the past year an average of 460 new suppliers was added monthly to the list of Chrysler subcontractors. Michigan has the largest number of the total list with 2805 in 120 cities; Illinois is next with 1039 in 56 cities; Ohio 917 in 95 cities; New York 668 in 67 cities; Indiana 608 in 61 cities; Pennsylvania 411 in 97 cities; California 296 in 32 cities; and the balance divided up in smaller numbers throughout 32 other states.

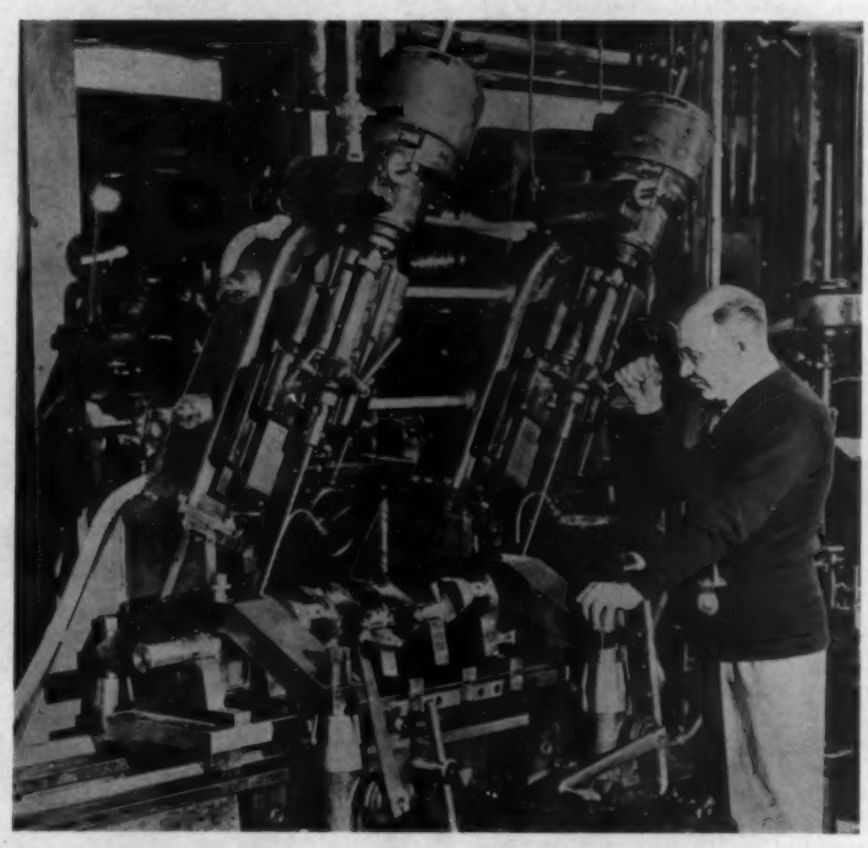
Perfect Subcontracting Technique

These brief statistics give an indication of the complexity of operations of a large motor corporation engaged in war production. Similar situations doubtless pertain with most other large corporations, although it is likely the technique of subcontracting has been perfected to a greater extent in the automotive field than in any other major industry.

Perhaps this is one reason why Henry J. Kaiser in recent weeks has been "looking into" the automotive situation as a postwar venture for his expanding operations. He has had personal conversations with Detroit interests regarding the organization of engineers, designers and manufacturing talent to undertake construction of a low-cost car, probably in the $400 price range. Kaiser is known for his army of "expediters" who chase around the country following through on orders placed with subcontractors.

First impressions of the West Coast tycoon on those he talked with here were

CONVERT SPARE PARTS INTO DRILL PRESS



QUICK ingenius conversion of standard machine tool equipment into special purpose machines in the war program is illustrated by this unit for deep-hole drilling of the force-feed lubrication holes through webs and crankpin of a crankshaft. Engineers of Hudson Motor Car Co., Detroit, assembled the equipment from parts of an engine lathe, two drill press heads and a specially built holding fixture. The shaft will be installed in engines for powering invasion barges. Better than 750 machines in the Hudson plant were converted for operations on the invader engine

distinctly unfavorable. He talked in the grand manner about buying up this plant or that plant and hiring this engineer or that engineer, as though all you had to do to start building automobiles was to keep spending the money. In one of these conversations, Kaiser was accompanied by a son to whom he turned occasionally for verification of some statement like, "But we won't need to make any dies for our car, will we Junior?" However, before the son could get a word in edgewise, his father would interrupt brusquely and state, "Shut up kid, I'll do the talking."

There is more than a suspicion that Mr. Kaiser is just the "front" man for an organization that includes some really capable engineers and production planners. His principal task appears to be to keep talking and let the hard-headed practical men in his company sift out from his running comment the ideas that are good and the ideas that smell.

It is understood one prominent automotive designer, formerly associated with Briggs, has been hired by Kaiser and is now going to work. But when the "old man" talks about how he can hire the best engineering and production brains in the business for $25,000 a year, he just does not know whereof he speaks. And how he proposes to merchandise a small car once it is built is something else again.

Ford Produces Amphibian Jeeps

The War Department has permitted release of the information that amphibian jeeps are in volume production in this area, which may be news to those outside Detroit but is old stuff here. A few weeks ago, correspondents, including this one, were shown the Ford amphibian jeep assembly lines, and were taken for rides in the handly little conveyances which take to water like the proverbial duck. Test drivers took four passengers each, into the amphibians and drove down a wood ramp at the Rouge plant property into a slip where Ford ore boats are moored for the winter. A change gear permits throwing the propeller shaft when the jeep hits the water and while the speed naturally is slow there is no difficulty in moving a full load through the water.

Steering in water is accomplished through the regular steering wheel which is connected permanently to a rudder by cables. Body is welded steel, water tight, with stuffing boxes at the points where driveshafts pass through the body. The cars use the same motor as do the land version of the jeep. There is a minimum of spray in negotiating smooth water, but operations in a rough sea probably would be pretty wet. However, bilge pumps take care of any shipped water, and the occupants shift for themselves.

Preparation of Ford's Rouge plant for air raid defense has been completed, according to announcement last week. Every building in the Rouge can be blacked out in 1 minute and 45 seconds, including not only lights but the glow of furnaces.

In one building is a control room, manned 24 hours a day, where a command switchboard takes incoming warnings of approaching airplanes and dispatches the signals to all Ford plants within 60 miles of Detroit over a special air raid telephone system on which no other messages can travel.

Sirens Sound Alarm

Throwing two switches sounds every air raid siren in the plants, both inside and outside buildings. Many of the plants, particularly those with broad expanses of glass windows, have special shelter areas, in some cases within a few feet of workmen's machines. Steel benches or tables, with thick steel tops, on which parts and finished work are stored, are raised high enough off floors to permit several persons to find refuge under them. Other refuge areas are around the concrete foundations and piers installed below floor level to accommodate heavy machines, where special benches have been installed for personnel. Some of these areas will handle better than 100 persons. Another refuge spot is an abandoned brick tunnel once used in connection with the coke plant.

Every building roof has been provided with pails of sand, stirrup and force pumps and pails of graphite. It has been found that throwing sand recklessly in an air raid, particularly around a machine shop, causes excessive damage by infiltrating into gears, shafts and other lubricated metal surfaces. Graphite, of course, would cause no harm in such an event and hence is more suitable than sand.

The Ford fire department has set up a school for instructing employes in the use of standard fire fighting equipment and the handling of incendiary bombs, over 5000 having been trained already.

New type of nylon aircraft tire, claimed to be 100 per cent stronger than the best previous tires, has been announced by the United States Rubber Co. here. Nylon is used in the fabric to replace cotton and rayon, and the amount used for one medium-size airplane tire is equivalent to 186 pairs of ladies' hose. The new tires are now in action. Tests conducted two years ago on bus and truck tires with nylon fabric first brought to light the ragged qualities of the material in this application.

Need for standardizing gagemaker's tolerances, permissible gage wear and other variables in gaging practice has led to the proposal emanating from the automotive industry for the American Standards Association to develop suitable standards for all industry, as outlined here last week. The extent of gaging operations and their importance is not generally appreciated. For example, a manufacturer of an airplane engine reports that each engine built requires more than 40,000 gage inspections which in turn requires the use at all times of about 100,000 gages. These must be checked at a rate of around 5000 gages a day and there are no general standards specifying what tolerances should be given the gagemaker in the manufacture of the gages, how these tolerances should be located relative to the limits of the part, and to what extent gages should be permitted to wear.

There is one tentative and incomplete gaging standard, B4a-1925, but it has not been accepted generally in industry. Common gaging practices vary from plant to plant and conceivably could account for discrepancies which would explain many difficulties arising between suppliers, subcontractors and procurement agencies.

Restrictions Continued on Use Of Copper in Automotive Parts

Restrictions on the use of copper and copper base alloy products in the manufacture of automotive parts have been extended by Limitation Order L-106 as amended.

Under the terms of the order these critical materials may not be used in the manufacture of any automotive parts, including replacement parts, except 15 specified items, and then only to the extent indicated. Thirteen of these were also exempted in the original order, issued in May, 1942. Despite the inclusion of two additional exempted items and of certain components of others, the amended order will result in considerable saving of copper and copper base alloy.

Added exemptions cover parts and components in which no practicable substitutes for copper and copper base alloy products can be used. The restricted materials may be used only to the extent necessary for the proper functioning of the parts. Authorization for the use of these products has hitherto been granted on appeal.

Exempted items are: radiators; cooling system control devices; electrical equipment; tubing, tube fittings and actuating parts; bearings, bushings, thrust washers; carburetor and fuel pump parts; plating; gaskets; transmissions; brazing materials; powdered copper; used as a minor alloying element in alloys other than copper base alloys; clutch facings and brake linings; speedometers, tachometers, heat indicators and oil gages; miscellaneous.

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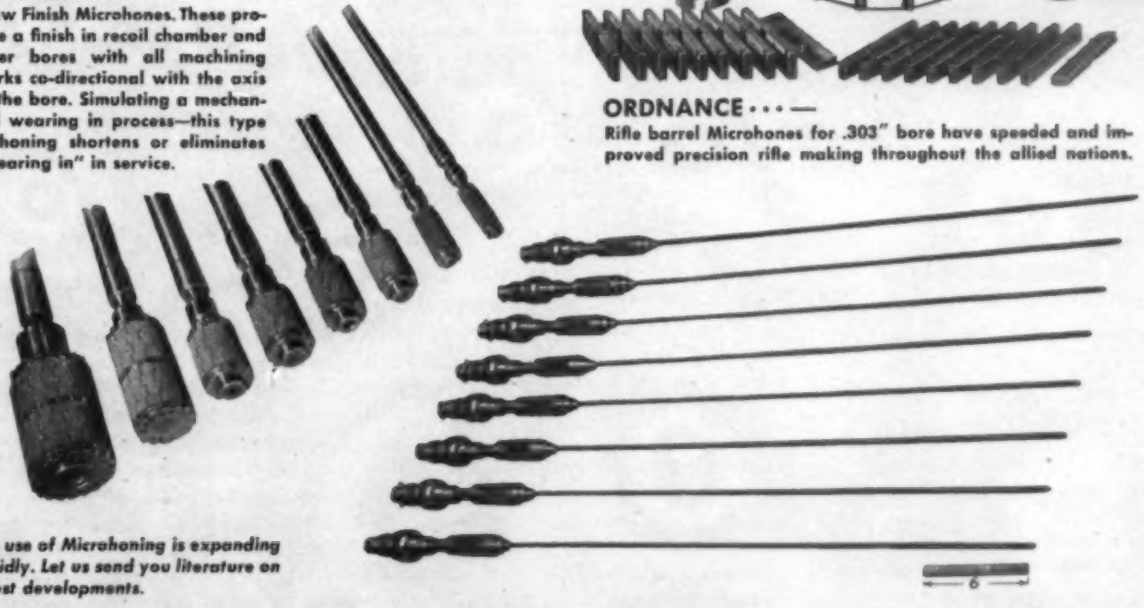

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WING TIPS

Center of aviation industry remains in southern California where famous octet directs production of over 60 per cent of military planes. Attain more air-power through interchange of materials, services

IF YOU were to put your finger on a map of the U. S. to point out the center of the aviation industry, you would have to keep it on southern California, in spite of the vast mushrooming the industry has experienced over the past two years. Home plants of North American, Douglas, Consolidated, Vultee, Lockheed, Northrop, Ryan and Vega are there, and these companies, along with the plants they now operate in other sections of the country, build more than 60 per cent of the country's military planes.

The southern California team is now whittling away at a backlog of $8,000-000,000 worth of orders. During the single month of November, 1942, it produced nearly 45 per cent more pounds of airframes than the entire aircraft industry produced per month at the time the war began; and this achievement was made with 17 per cent fewer employes and 12 per cent fewer man-hours than the entire industry was using for the lower production figure in December, 1941.

Regarding this record as far from any miracle, the octet of California plane builders prefers to call it merely vindication of the idea of co-operation, as exemplified in the western Aircraft War Production Council, of which all the above companies are members, with Boeing 1000 miles away at Seattle a powerful but ex-officio participant as well. Basically the council keeps its sights trained on the goal of more air-power per hour, through free interchange of manpower, materials, methods and machines, and there are hundreds of examples to prove the soundness of the policy.

$200,000 Worth of Help

Last summer, North American was asked to build a special type of airplane, using wing flaps as dive "brakes". The company had done no work on dive flaps, and faced long months of engineering and wind tunnel testing. So it called on the council for help. Vultee Aircraft, at Downey, Calif., had the answers, because it was building dive bombers; so it turned all the data over to North American, without charge. J. H. Kindelberger, president of North American, estimated the value of the gift at $200,000. This was another fine example of co-operation in the war effort.

Kindelberger, by the way, is one of eight men on the council's board of directors who take turns at being president of the group for three-month periods. Others are Donald W. Douglas, Harry Woodhead of Consolidated, Robert S. Gross of Lockheed, L. T. Cohu of Northrop, T. Claude Ryan, C. S. Gross of Vega and G. M. Williams of Vultee. Significant is the fact that while this crew of executives include some of the pioneers of the aircraft industry, their average age is only 46.

Down the line from the topside management, the council is organized by functional division, two principal ones being production and manpower. Within each division are working groups known as advisory committees which bring together the top men from each company in each specialized field. Thus, experts on the manufacturing committee work on problems of production control, parts fabrication, methods improvement, tooling co-ordination, tooling standards, manufacturing standards and machine facilities.

Some case histories of how co-operation works: One day last July the factory manager at the Douglas El Segundo plant found he was suddenly short of heat treating capacity for certain aluminum castings. He telephoned Paul Buckner at Northrop and explained the situation. The latter said only, "Give me an hour." In less than that time, Northrop had arranged to run three shifts on all furnaces on a Sunday to accommodate the Douglas work. On Monday morning 35 furnace loads of heat treated castings were delivered to Douglas and a slow-down to production halted.

Late one evening, Mike Craemer at Vega called Buckner at Northrop and said he needed five sets of landing-gear forgings to keep a Flying Fortress line moving until a new shipment was received. Within half an hour Northrop had rushed some forgings across town to Vega. A few days later it was Northrop that needed help because of a shortage of small forgings used in engine nacelles. Vega came to the rescue with 2500.

Another day, North American had a group of P-51 pursuits ready for delivery to the British, but a shortage of engine-cooling fluid held them on the ground. Lockheed had a substantial supply of ethylene glycol, so a supply was hurried over to North American and the P-51's were away. A short time afterward, North American, in turn, divided its supply of 2-inch chrome-molybdenum steel tubing with Lockheed so the latter could keep its line of P-38 fighters moving. Next week both Vultee and Consolidated ran short of Alclad sheet, and Lockheed was able to divide 380,000 square feet between the two.

Since the council began its work over a year ago, there have been 16,338 such material exchanges arranged, about half of them with council member companies and the other half for the assistance of manufacturers outside the council.

The manpower division of the council is concerned with such problems as employe training, transportation and housing, control of labor turnover and absenteeism, safety, medicine, care of children of working mothers, etc. It has had a several months' start in this field over the Automotive Council for War Production in Detroit which only March 6 announced organization of a manpower utilization division to consider similar problems among its member companies.

Truancy a Morale Problem

Absenteeism—current bugaboo in the manpower field—for example, is the concern of the industrial and public relations committee of the council. As a measure of the critical nature of absenteeism, one council member in its California plants alone lost more than 700,000 man-hours because of it in one recent month. That was the equivalent of 40 bombers, assuming, of course, the materials had been available for full utilization of available man-hours.

John C. Lee, youthful and personable manager of the Coast organization, says, "In dealing with absenteeism, I believe, we are dealing with the broad question of public fighting spirit. The workers in the southern California aircraft plants and their families represent a total population about equal to that of the city of San Francisco (650,000). They come from all walks of life. They are not a 'labor force'; they are not a segregated group. They are a varied and complex community — a big segment of the public.

"They will meet their war production responsibility and minimize absenteeism if and when their community, and if and when the public generally, feel strongly enough about this scrap we're in.

"This is partly a job for industrial relations, partly a job for public relations, partly a job for the government. It is particularly a challenge to the use of industrial and government information as an aid to war production."

Airplane output in terms of weight,

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Photo by Office of War Information

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One contributing factor in making possible the nth degree precision of these guns is Sunoco Emulsifying Cutting Oil. For example, one large plant was having trouble with the finish of its gun parts. At the suggestion of a Sun Oil Engineer—one of those well-known Doctors of Industry—a change was made in the coolant on the grinding operation. One part of Sunoco Emulsifying Cutting Oil was mixed with 45 parts of water and tried on one machine. Improvement in finish was so marked it could be seen with the naked eye. Immediately Sunoco was adopted for all machines using a soluble cutting oil . . . and besides getting better finish, the company saved nearly 50% in cutting oil cost!

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which is after all the real index, of the eight companies making up the West Coast council now is about 3½ times what it was in December, 1941; but total man-hours consumed in building the present volume is only twice the level of 15 months ago. This indicates the pounds of airplanes produced for each man-hour worked have nearly doubled in this short time. That is the measure of "more airpower per hour."

Miles of Blueprints in Designing New Bomber

How much work does it take to engineer a new plane? Glenn L. Martin Co. has supplied some interesting figures with respect to its B-26 medium bomber. The Martin engineering department at Baltimore headed by the capable W. K. Ebel, now numbers 2200, and by the end of last year had produced some 19,036 drawings for the B-26 job. Each drawing of course is reproduced a number of times and if all these blueprints were 1 foot wide and placed end to end, they would stretch for 585 miles (and would certainly make a queer sight!).

Before the first B-26 was delivered to the Army Air Forces, 485,000 man-hours of engineering were required, and an additional 440,000 man-hours have been encountered to make the changes dictated by combat experience. Original engineering work on the ship was crowded into eight months and normally would have taken twice that long.

To deliver the first of the Martin Mariner patrol bombers to the navy, the engineering department expended a total of 1,300,000 man-hours, and there have been tens of thousands more required in effecting changes.

Sketching the mechanics of how a new combat airplane originates, a facetious Martin spokesman, after listing the several basic types of ships now being flown, says, "A new plane of one of these types originates as a brainstorm. Somebody dreams up a ship that will do 726 miles an hour, climb to 76,000 feet in 5 minutes flat, carry 30 tons of bombs, be as self-effacing as a chameleon, and do everything but hum Annie Laurie in four-part harmony." How about carrying 400 passengers to Europe and back on 10 gallons of gasoline? At this point higher mathematics enter.

MASS ASSEMBLY ADAPTED TO BUILD TROOP-CARRYING GLIDERS

Principles of automotive mass assembly have been adapted to the manufacture of troop-carrying gliders at the Iron Mountain, Mich., woodworking plant of Ford Motor Co., until six months ago the source of Ford station wagon bodies. Faced with a formidable conversion program before it could launch glider production, the company late last summer swept two buildings clean and dismantled part of the equipment in another.

Today the glider assembly system spreads through these buildings like fingers of an open hand. The thumb is Building 1, where the steel fuselage skeletal structure is equipped with fairing; where fabric is doped and painted, and gliders are finally assembled. Three fingers represent Building 3, where inboard wings, floors, fairing, dorsal fins, ailerons, skins, rudders and fins, doors, door frames, elevator and stabilizers are made and assembled. The smallest finger hooks into Building 2, where shipping crates are made.

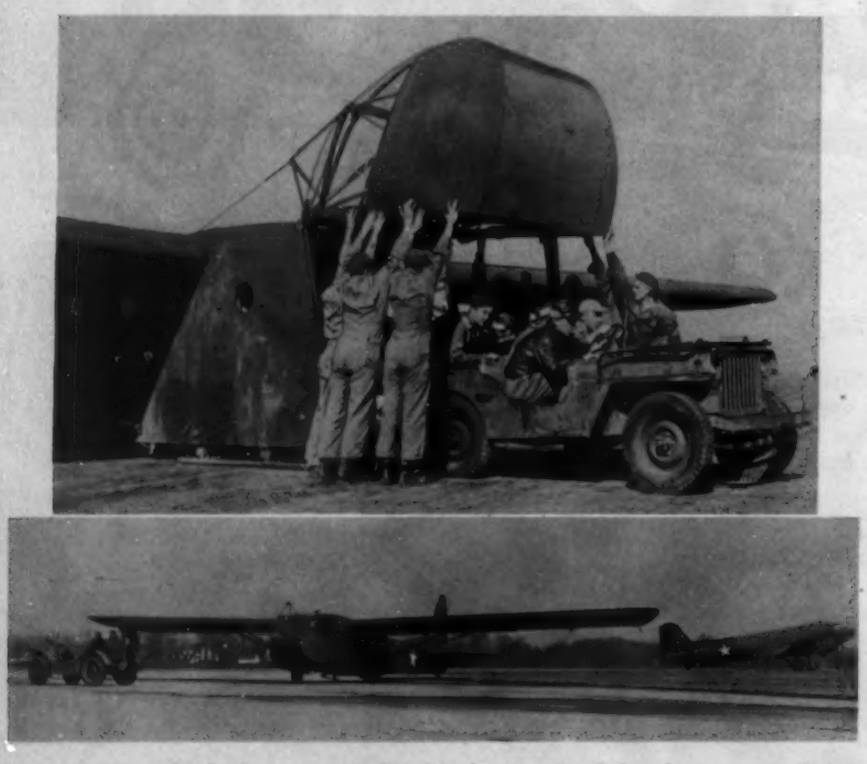
Bulk of fabrication is done in Building 3. Hundreds of skilled wood-workers daily handle hundreds of thousands of parts of the glider sections. Speeding the gluing of the thousands of wood glider parts in this building are Ford-designed fixtures, using a new method to cut drying time from eight hours to less than 10 minutes. Set into the fixtures are networks of rubber tubing, which contact glue joints of the parts being assembled. Linked to the building's steam heating system, the rubber veins swell and dry the glue through the application of heat and pressure.

Use Quick-Dry Methods

Although the quick-dry method is used mainly in the fitting of plywood skin to the wings of the glider, it also is successfully employed in gluing ribs, stringers, bulkheads, stiffeners and other structural parts. In another drying process, it is combined with electric jigs to quick-dry glider parts in the fixtures.

To the fairing rooms, which once served as drying kilns, first come the prefabricated steel skeletons of the fuselages. As they arrive in these long corridors, the steel tubing is inspected and then the fairing job is started. Floors, spruce and mahogany plywood crossmembers, skids, door frames, hardware fittings and other parts are attached and the fuselage sections move on into the adjoining dope room.

Anteroom to the final assembly section, the dope room, in which glider



Heavy Army glider lands, its nose is lifted and a jeep, loaded with six men, rolls out onto the field at Victorville, Calif. Below, a glider of the type manufactured by Ford Motor Co., and its towing plane

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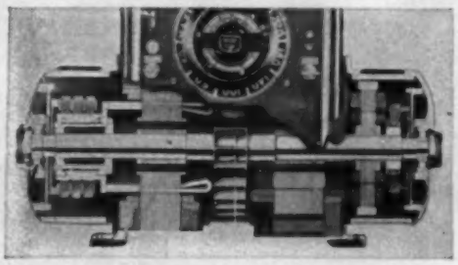

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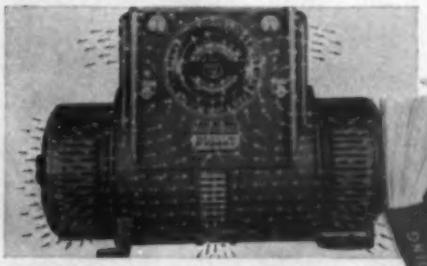

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fabric is treated and camouflaged, receives everything manufactured in other departments. Dominating the room are two wide spray booths, in which masked workers spray protective coats on virtually every part.

In the final assembly room, the 20 major glider parts are merged. Joined together are the three sections of the fuselage; seven empennage parts; four wing sections, two ailerons; two V-struts, and two landing gears, one for training, the other for combat. During the assembling of the glider, pilot equipment also is installed in the cockpit and plexiglas is fitted into the nose.

Immediately following inspection approval, the glider is dismantled, fitted into crates, and then lifted by crane into long trucks, the same carriers as used to transport B-24 bomber assemblies from the Ford bomber plant at Willow Run to the Southwest.

More Alloy Steel Products Directed to Aircraft Industry

Importance of supplying the quantity, type, and grade of alloy steel products needed by the aircraft industry was stressed at a meeting of the Iron and Steel Industry Advisory Committee with officials of the WPB Steel Division.

H. G. Batcheller, Steel Division Director and government presiding officer at the meeting, reported that progress is being made in directing an increasing flow of alloy steel products to aircraft manufacturers. An Aircraft Alloy Steel Section has been established in the division to take direct charge of the problem, and the industry committee offered full cooperation in aiding the section to carry out its responsibilities.

Discussions at the meeting revealed that difficulties with another phase of the alloy steel situation—utilization of alloy steel turnings—are rapidly being solved. Among problems which have arisen in channeling alloy steel turnings back into war production are the difficulty in segregation; light weight, which limits their use in charging the furnaces; and the restrictions on permissible alloy content in National Emergency Steels.

Despite these obstacles, the Steel Division reported 32,355 tons of alloy turnings were allocated during February, an increase of nearly 30 per cent over January allocations.

NEW SUPERHARD RIVETS SAVE FABRICATING TIME AND WEIGHT

FIRST described in *Steel* for Feb. 15, p. 74, a new superhard "Hishear" rivet developed by an engineer of North American Aviation Inc., Inglewood, Calif., is illustrated in accompanying views. One shows (top left) the rivet itself with the small aluminum collar which is forced over the grooved end of the rivet to form a modified conical head. This is done by means of the special tool shown in a second illustration (bottom) being fitted into a riveting gun. The third photo (right) shows a riveting team driving and bucking one of the new rivets into a wing section of the P-51 Mustang fighter plane. About 1000 of the rivets are used in each of these wings, and are installed five times as fast as bolts, at the same time effecting a 60 per cent saving in weight compared with equivalent bolts and rivets used previously

Effects as Alloying Element in Steel Interest Metallurgists

RESEARCH in methods for introducing boron as an alloying element in steel continues with encouraging progress. Results differ in some details, but agreement is universal as to the hardenability properties of boron on ordinary carbon steels when introduced in very minute quantities with complex alloys. In fact, hardening influence of the element in extremely small amounts is the startling revelation.

Most steel metallurgists are experimenting with boron. Interest in developments is widespread; a round-table on the subject attracted an overflow at the American Institute of Mining and Metallurgical Enginers, New York, Feb. 17.

Dissemination and exchange of information on boron in steel is retarded apparently by fear of aiding the Axis. However, German metallurgists had made progress in alloying steel with boron 20 years ago. Their reports as to the effect on grain-size, brittleness and hardenability at that time was given scant and skeptical attention. Surprisingly, a few years back, a technical paper from Germany threw boron out the window, in effect saying practical application of the boron alloyed steel was unsuccessful. There is now reason to believe this paper was a smoke-screen. These facts are well known by steel metallurgists.

Accept Boron's Hardenability Effect

Metallurgy of boron steel has yet to be stabilized, but establishment of the first specifications for commercial applications involving some normalized quenched carbon steels may not be far-distant. Obviously the effect of boron on hardenability is accepted and the possibilities for further conservation of strategic materials in alloys, including chromium, molybdenum and manganese, are timely.

Boron is a strong deoxidizing element and appreciable deoxidation is apparent in steel treated with it, affecting the iron oxide in the metal somewhat similar to the action of borax used as a flux.

On control of the quantity of boron introduced with complex alloys apparently rests the success and speed with which boron steel is developed and on which commercial specifications will be based. Satisfactory methods for determining chemical and other analyses are factors and substantial progress is being made, notably with the colorimetric system. When added in amounts of about 0.003 per cent almost straight line action results in carbon steel hardenability.

Unless properly added, boron having maximum effect in increasing hardenability when added 0.003+, some fading in last ingots is experienced. In deoxidation ability, boron approximately is equal to aluminum and for fading last ingots an addition of aluminum is suggested as a protective agent. Character of the pearlitic structure of the metal is not materially changed by boron treatment. Transforming of structure is more notable in ferrite which is increased and slightly coarser within heat ranges of 1600 to 2100 degrees Fahr.

Influence on Ductility

Effect of use of such small quantities in attaining hardenability may be that boron concentrates at the Austenitic boundaries. Penetration of hardenability even with 0.001 to 0.005, is deep and uniform in three-inch bars of 0.28 to 0.44 carbon in some tests.

In complex alloys, the influence of boron or combined reactions with the other alloying elements in steel is so apparent extreme care is required in introduction; amounts as low as 0.0002 to 0.0006 have distinct traceable reactions.

Changes in grain size from boron additions are uniform regardless of the size of the steel, small or large ingots.

Effect of boron on ductility of medium carbon steel may depend on the complex alloy. Some claim improved ductility and impact with proper quench. Higher alloy steels are less affected by boron than ordinary carbons; also the higher the drawing temperature of the steel the less may be expected of the element. Addition of too much boron has an adverse working effect on the metal, again stressing importance of the proper amounts introduced.

In tool steels, effect of undissolved carbides weakens the influence of boron, but with carbon steels as low as 0.10, with amounts as low as 0.0005, boron effect is distinct. The need of more definite measuring practice as to analysis determination in such small quantities is apparent, although methods used in determination of boron in steel, both by the chemical (colorimetric) and spectroscopic, are developing with progressive success.

For increasing hardenability, boron apparently has maximum effect when added in the amount of 0.003+. Improvement in analytical methods for determining such small quantities are improving, but the precise amounts actually remaining alloyed with the steels is still a problem, one which must be considered in compiling commercial specifications.

The colorimetric procedure in determination of boron in steel has progressed to the point where accurate readings are now possible down to 0.0002. In the assembly of commercial specifications, this will greatly assist research in the application of boron steels for specific uses. From 15 to 20 colorimetric determinations in eight hours are possible. Standardization of color materials used in readings under the system are in progress to eliminate confusion.

Drop in the average grain-size curve when larger percentages are added has not been fully ascertained. It may be that higher heat-treating temperatures produce an increased effect; that boron is possibly present as stable carbides.

Addition of too much boron makes for brittleness, steel breaks up in rolling, ductility having been destroyed. Quench effect on some steels as compared with material in the annealed condition is apparent with tests continuing. Most tests are generally made after annealing for hardenability. The quantity required to attain hardenability is not enough to affect the hot working of the steel.

Emergency Ore Route Would Require 60 Days To Complete

Proposed alternate ore route designed to by-pass the locks at Sault Ste. Marie in case the latter were closed to traffic by sabotage or other enemy action will be completed to a point where the new route could be brought into use within 60 days should the Soo locks be closed.

The project includes construction of ore yards and piers at Escanaba, Mich., and improveme ts to the railroads between the ore ranges and Escanaba. If the Soo locks were closed, ore would be hauled to Escanaba by all-rail from the mines, or transported by vessel to Marquette, Mich., and by rail from there to Escanaba.

Deep interest in the plan was expressed when it was launched last autumn. However, it was considered only as an emergency measure to be used only in event the Soo locks were wrecked, according to vessel operators.

Some confusion resulted from the over-enthusiasm of certain proponents of the project who stressed the shorter total distance the ore would have to be moved by the alternate route and envisaged the project as a permanent new route. Shippers point out that the additional handling involved and the greater cost of rail shipments would more than nullify any advantages resulting from the shorter haul.

Participating in ceremonies at the presentation to the Lindberg Engineering Co., Chicago, were, left to right: L. A. Lindberg, president of the company; Edward J. Kelly, Chicago mayor; Rear Admiral Alex M. Charlton, inspector of naval material in the Chicago district; Rear Admiral Wat T. Cluverius who presented the pennant; Maj. Lauris Eek, Sixth Service Command, who presented the lapel pins to employes

Lieut. Commander Arthure Langfield of the Navy presents an "E" pin to Barbara Daugherty, oldest woman employe in years of service of the Barnes-Gibson-Raymond Division of Associated Spring Corp., Detroit. In background is Michael Forster, veteran male employe, and, at right, John Tullis who accepted the pins for employes

A "family luncheon" featured the presentation ceremonies at Western Gear Works, Seattle. Photo shows relatives of the workers touring the plant following the luncheon

Regional Control Plan Sanctioned By WPB for Northern California

SAN FRANCISCO

Over the past year steel warehouses throughout the country have had great difficulty in maintaining stocks needed to serve the small and emergency needs of essential industries.

This condition has been particularly acute in the San Francisco Bay area. For this reason, and because this district is particularly suited to dealing with the problem on a local basis, a plan has been developed for regional control of steel warehouses in this area.

This plan applies only with respect to the steel products listed in Schedule A of Order M-21-b.

The plan has been given sanction through a directive issued by Curtis Calder, Director General of Operations, WPB, and steps necessary to put it in effect are now being taken. The plan is expected to be in full operation by April 1.

The plan has three basic features.

1. *To provide a central place for information as to available warehouse stocks of steel.* A Warehouse Section will be established in the San Francisco regional office, headed by the regional director or a deputy named for the purpose. The Warehouse Section will establish and maintain, from such information as may be voluntarily furnished by warehouses subject to the plan, a running inventory of steel available in these warehouses.

Follow Usual Order Routine

Customers wishing to purchase steel from warehouses will continue to place their orders in the usual way with individual warehouses, never with the Warehouse Section. If the particular warehouse with which the order is placed does not have the item requested in his own stock, he may

(a) contact the Warehouse Section to determine where such item is available. In this case he can then either refer his customer to such stock, or arrange himself to have his customer's order filled from that warehouse, or

(b) refer his customer to the Warehouse Section which must give the customer the names of all warehouses where the records of the Warehouse Section show the item in question is available.

2. *To act as a central information and service agency on purchases by warehouses.* This will enable replacement orders from individual warehouses for less than carload lots to be pooled so that stocks may be more quickly replaced, but will insure such pooling takes place under government supervision and control.

Warehouses wishing to order replacements in L.C.L. lots may report to the Warehouse Section, which will group the orders into mill lots. Such grouped orders will be placed with the mills in the name of one or more of the participating warehouses and will be shipped to whichever of the warehouses may be agreed on to take charge of the particular shipment. When received, the steel will either be held in the receiving warehouse for the account of the various owners, or can be distributed among them according to wishes of the participants.

3. *To prevent excessive depletion of warehouse stocks.* As a further means of maintaining adequate warehouse stocks, the regional director is authorized to take the following actions from time to time relating only to the warehouses subject to the plan:

(a) Pursuant to paragraph (d) (4) of order M-21-b, as amended, change the limitation on deliveries by steel warehouses subject to the plan by prescribing higher ratings to be required for such deliveries than those specified in paragraph (d) (1) of that order. Action hereunder must relate to specified products or classes of purchase orders, not to individual purchase orders.

(b) Pursuant to Paragraph (d) (1) of Order M-21-b, as amended, grant exceptions and permit deliveries in particular cases of hardship where deliveries are otherwise prohibited by that paragraph or by any limitation imposed by the Regional Director pursuant to the previous paragraph of this letter.

(c) Where necessary to insure essential replacement in warehouse stock, up-rate particular deliveries by warehouses to not higher than AA-1.

Quotas and inventories will continue to be controlled by general orders issued by the Warehouse Branch of the Steel Division, but recommendations as to changes in quota or inventory restrictions may at any time be made by the Warehouse Section of the regional office.

This is a novel procedure, but with the promise of full co-operation, it has every chance of success.

Warehouses To Be Permitted To Rebuild Steel Stocks

To facilitate rebuilding of warehouse stocks of steel products before the introduction of CMP, the WPB has amended Order M-21-b to permit acquisition of restricted amounts of any product in excess of established quotas for the first quarter of 1943.

Amended order permits those warehouses which were unable to maintain inventories because of inadequate receipts during 1942 to accept deliveries of any product classification until March 31 provided that the deliveries in excess of quotas do not exceed the deficiency on all product classifications for 1942.

Other changes made by the amended order:

1. A definition of "minimum carload" to mean a carload weighing not less than 40,000 pounds is included in the order.

2. To permit warehouses to accept deliveries from idle and excess inventories, plate quotas are increased from 100 per cent to 135 per cent of the base tonnage in the states of California, Oregon, and Washington; and from 100 per cent to 125 per cent in all other states.

3. Quotas for wire rods are eliminated from the order because warehouses have actually purchased very few rods under the quotas.

4. Warehouses purchasing products commonly known as "seconds"—steel products invoiced as less than prime quality—are permitted to obtain their quotas from any producer. Previously, such warehouses were required to obtain quotas from the producers from whom they had purchased seconds in 1940. This change was made necessary by shifts in production by various companies resulting from the issuance of production directives.

Warehouse Sales of Brass, Wire Mill Products Under CMP No. 4

To avoid confusion, copper order M-9-a has been amended to place control of warehouse sales of brass and wire mill products entirely under CMP Regulation No. 4.

Under this regulation, warehouses distributing brass and wire mill items have been permitted since Feb. 15 to fill authorized controlled materials orders, or orders bearing preference ratings of AA-5 or higher for 500 pounds or less of any item to any one destination at any one time. No more than 2000 pounds of any one item may be delivered to a customer during a calendar month. All orders must be accompanied by a prescribed certificate, signed by the person placing them.

Previously, Order M-9-a permitted the delivery of brass and wire mill products only on orders bearing AA-5 or higher ratings. Prior to issuance of CMP Regulation No. 4, no quantity restrictions were placed on deliveries by warehouses.

MEN of INDUSTRY

S. B. TAYLOR

W. F. THATCHER

E. C. EAGLEN

HARRY R. MEYER

S. B. Taylor, since 1931 works manager, Reliance Electric & Engineering Co., Cleveland, has been elected manufacturing vice president. A native of Kentucky and a graduate in electrical engineering in 1924 from Purdue University, Mr. Taylor took a year of post-graduate work in business administration at the University of Illinois before joining the engineering department of Reliance. He transferred to the manufacturing department in 1930 and a year later became works manager. He was elected a director in 1935.

Officers re-elected are: President, **Clarence L. Collens;** vice president and treasurer, **H. Morley Hitchcock;** engineering vice president, **A. M. MacCutcheon;** sales vice president, **James W. Corey;** secretary, **C. V. Putnam;** assistant treasurer, **H. F. Walters.**

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W. E. Zimmerman, heretofore purchasing agent, Greer Steel Co., Dover, O., has been promoted to general manager. **H. R. Walter,** assistant treasurer, has been advanced to treasurer.

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H. E. Boedecker has been appointed assistant general superintendent of the Charleston, S. C., works of Pittsburgh Metallurgical Co. He formerly was superintendent of electrical and mechanical departments, Atlas Steels Ltd., Welland, Ont., Canada.

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Welling F. Thatcher has joined Cross Gear & Machine Co., Detroit, as management executive, and will assist **Milton O. Cross Jr.,** president. Mr. Thatcher was recently president of United States Steel Corp.'s subsidiary in Brazil and has held executive positions with Chrysler Export Corp., Servel Inc., and Union Carbide & Carbon Corp.

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E. C. Eaglen has been appointed co-ordinator of postwar planning, Oliver Iron & Steel Corp., Pittsburgh. He formerly was sales engineer of pole line materials for Oliver, and has had many years experience in production, engineering and sales.

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John F. Byrne has been elected a vice president, Koppers United Co., Pittsburgh. Mr. Byrne is general manager of the company's Blast Furnace Division, Granite City, Ill., and will continue in that position.

A new and modern coke plant consisting of 49 ovens and equipment for recovery of all usual by-products is being erected by Koppers at the Granite City plant. It will be operated by the Blast Furnace Division for Defense Plant Corp.

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Harry R. Meyer has been named general manager of sales, By-Products Steel Corp., Coatesville, Pa. He formerly was manager of direct sales for Lukens Steel Co., of which By-Products Steel is a subsidiary.

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E. A. Considine has been appointed assistant to H. G. Irwin, H. G. Irwin Lumber Co., Garland, Pa.

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Frederick V. Geier, president, Cincinnati Milling Machine Co., Cincinnati, has been elected a director, American Rolling Mill Co., Middletown, O.

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Leland M. Hogan has been appointed eastern district manager for American Welding & Mfg. Co., Warren, O., with headquarters at room 1722, 500 Fifth avenue, New York. The past 20 years he has been with the Steel & Tubes Division of Republic Steel Corp. After holding various positions, in 1936 he was made sales manager of the New York district.

F. L. Schneider will act as Chicago district manager for American Welding & Mfg. Co., with offices at 866 Civic Opera building. He has been associated with the steel industry his entire business life, starting in 1915 with Joseph T. Ryerson & Son Inc. In 1929 he joined Chicago Steel Service Co., following which he became associated with Edgar T. Ward's Sons Co.

Carl I. Laraway has been made comptroller of operations, and **Frank J. Shanaberg,** manager of American Welding's product development department. The past 17 years Mr. Laraway has served as works accountant with Steel & Tubes

L. M. HOGAN

F. J. SHANABERG

C. I. LARAWAY

F. L. SCHNEIDER

Division of Republic, while Mr. Shanaberg the past four years has been assistant to the manager, product engineering department of Steel & Tubes Division.

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Robert A. Bell, formerly associated with Superior Steel Corp., Carnegie, Pa., has been appointed manager of sales, Darwin & Milner Inc., Cleveland, tool steel specialists.

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French Peterson, for 11 years associated with the United Light & Power Service Co., Chicago, recently as head of the statistics and federal reports section, has joined the Keily O'Leary Steel Works, Chicago, as comptroller.

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Lt. Col. John Slezak, since last December deputy chief, Chicago Ordnance District, has been promoted to the rank of colonel. He first went to active duty with the district in January, 1942, leaving the presidency of the Turner Brass Works, Sycamore, Ill.

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Andrew H. Phelps, vice president in charge of purchases and traffic, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has received the Westinghouse Order of Merit for exceptional service to the electrical industry and his company in wartime.

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Lincoln R. Melville, former personnel director, Buffalo Pipe & Foundry Corp., Buffalo, is slated to graduate as an ensign from the midshipmen school at Columbia University.

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Charles F. Christopher recently resigned as special engineer, Steel Co. of Canada, Hamilton, Ont., to take care of all steel melting operations of Continental Roll & Steel Foundry Co. His time will be divided between the company's plants at Coraopolis, Pa., Wheeling, W. Va., and East Chicago, Ind.

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Alvin A. Borgading, who was appointed purchasing agent of American Car & Foundry Co., New York, last December, has now been advanced to general purchasing agent. **George W. Brown,** assistant purchasing agent since 1939, has become purchasing agent, and **Herbert Streader,** assistant purchasing agent, has been named assistant general purchasing agent.

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Perry J. Rieppel, welding engineer, has been named to the research staff of Battelle Memorial Institute, Columbus, O., where he will assist in welding research on industrial and governmental projects. He formerly was associated with the Buffalo plant of Curtiss-Wright Corp.

OBITUARIES . . .

John E. Fredrick, 77, chairman of the board, director and member of the executive committee, Continental Steel Corp., Kokomo, Ind., died March 3, in Indianapolis. He was one of the founders of Kokomo Fence Machine Co. in 1896, and in 1901 helped to organize and was made general manager of the Kokomo Steel & Wire Co. When Continental Steel Corp. was formed in 1927, which included the Kokomo Steel & Wire Co., Superior Sheet Steel Co., Canton, O., and Chapman Price Steel Co., Indianapolis, Mr. Fredrick became chairman of the board.

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Percival Roberts Jr., 86, Philadelphia, member of the first board of directors, United States Steel Corp., retiring in 1935 after serving 34 years, died March 6, in New Orleans. In 1900 when the Pencoyd Iron Co., organized in 1852 by his father, was merged with the American Bridge Co., Mr. Roberts became head of the latter concern. Mr. Roberts was the last member of the original board of directors of the Steel corporation. From 1911 to 1935 he served on the finance committee.

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Peter C. Patterson, 73, former vice president, National Tube Co., Pittsburgh, in charge of engineering and operations, died March 4. He joined the company in 1886 as a draftsman, later becoming foreman and superintendent of the Lapweld mill, chief engineer, assistant vice president in charge of operations and vice president in 1926, serving in that capacity until his retirement in 1936.

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Frank J. Lanahan, 73, died March 2, in Pittsburgh. One of Pittsburgh's prominent industrialists and civic leaders, Mr. Lanahan at one time was associated with the Grogan Co. and later organized the Fort Pitt Malleable Iron Co., McKees Rocks, Pa., of which he was president. He was a director in a number of businesses and institutions.

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Herman J. Lumpp, 59, vice president, Midwest Steel & Iron Works Co., Denver, died in that city, recently.

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Scott Follansbee, 53, Cleveland district sales manager, Follansbee Steel Corp., Pittsburgh, died March 7, in Cleveland. Before going to Cleveland Mr. Follansbee made his home in Pittsburgh, where his father founded the Follansbee organization many years ago.

SCOTT FOLLANSBEE

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John Wesley Morrison, 70, branch manager, Crucible Steel Co. of America, Denver, died in Tucson, Ariz., recently.

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Arthur C. Flory, 60, the past 24 years manager, steam turbine department, Allis-Chalmers Mfg. Co., Milwaukee, died March 1, at his home in Wauwatosa, Wis.

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Fred T. MacRae Jr., 49, executive vice president, White Motor Co., Cleveland, died March 4, in that city.

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George F. Downs, 70, former president, Lackawanna Steel Co., Lackawanna, N. Y., died March 1, in Palm Beach, Fla. He joined Lackawanna Steel in 1905 as assistant plant superintendent. In July, 1920, he was elected president, from which position he resigned in 1922 after the merger of Lackawanna with Bethlehem Steel Corp.

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Charles T. Main, 87, founder of the engineering firm of that name, Boston, and widely known as a designer of industrial plants, died in Winchester, Mass., March 6. He was former president, American Society of Mechanical Engineers, and had received numerous medals for scientific and engineering developments. He established the Charles T. Main award for student members of ASME, and was a member of other engineering societies.

Government Aid Increases Metals Output To Supply Other Nations

TORONTO, ONT.

WHILE still short of many strategic metals and minerals, the Dominion has increased production of a number of important items to the point of self-sufficiency and also is supplying large quantities to the United States and others of the United Nations. Improvement has been due in some instances to enlarged output by older companies, which have increased production at the expense of ore reserves, receiving prewar prices. In other cases operations have been aided by capital assistance grants or increased price from the Canadian and United States governments.

As an example, while International Nickel Co. of Canada Ltd., Noranda Mines Ltd., Hudson Bay Mining & Smelting Co. Ltd. and several other established copper producers receive only slightly more than 10 cents per pound for copper under contracts made in 1939, as much as 17 cents, U. S. funds, has been paid in certain government-assisted projects, through arrangements made with the Metals Reserve Co. of the United States.

Similarly lead and zinc in excess of amounts covered by Empire agreements have risen sharply in value. Molybdenite is quoted at practically double the prewar figure and tungsten, mica and other minerals have benefited by special arrangements. To the present time agreements with potential and current producers have been implemented largely by individual contracts and as prices are governed by circumstances, such as smelter charges, freight rates, costs, etc., quotations have not been published, except for a few metals.

However, the metals controller has released quotations, including the following: Antimony metal, 16 cents per pound f.o.b. Tadanac, B. C.; beryllium, minimum 10 per cent BeO, $100 per ton; cadmium, 90 cents per pound; chromium, for low-grade ore for treatment at Chromeraine mill, $3.90 for 10 per cent to $16.45 for 32 per cent, with high-grade based on 48 per cent, $43.50 per gross ton; copper, U. S.ceiling 12 cents per pound but bonuses have been paid up to 5 cents per pound and in rare cases 7½ cents by arrangements with Metals Reserve Co.; fluorspar, based on U. S. price of $24 per ton at Rosiclare, Ill., for 85 per cent; lead, base price 6½ cents per pound, New York; tungsten, for ores and concentrates containing 70 per cent, meeting Metals Reserve Co. specifications, $26.50 per unit, f.o.b. Welland, Ont.; mercury, price same as in the United States, $194 to $196 flask, plus exchange, but minus United States duty of $19 per flask; molybdenite, as molybdenum sulphide, approximately 85 cents per pound, f.o.b. Ottawa, Ont.

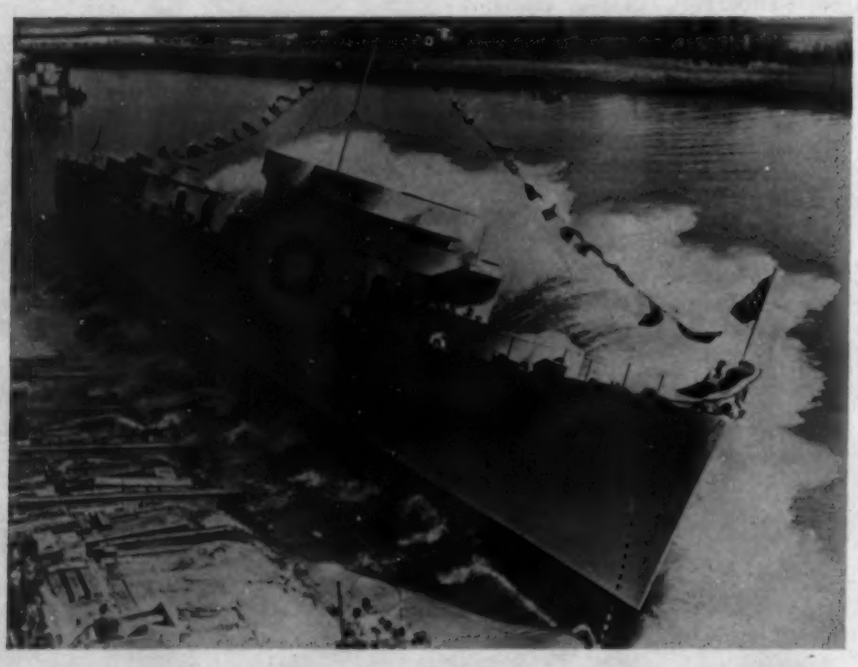
Cargo Ship Deliveries Up

Canadian yards are delivering eight to ten cargo vessels of 10,000 tons per month. Since Dec. 21, 1941, they have completed 97 ships of that size and at present 58 ships of that class and 12 of the 4700-ton class are on the ways. One 10,000-ton ship has been converted into an oil tanker and four others are being similarly altered. Contracts have been placed recently for three 3700-ton tankers.

Wartime Prices and Trade Board has taken over jurisdiction over manufacture of certain articles containing steel, iron and other metals, including stoves, vacuum cleaners, washing machines, radios and parts, refrigerators, electric ironers and others. The new order prohibits production of radios and phonographs for civilian use but exemptions in the original order are continued and permission for maintenance is added. Domestic washing machine manufacture was prohibited under the earlier order after April 30 and vacuum cleaners after Aug. 15, 1942, and the same restrictions apply to household electric appliances. Commercial laundry and dry cleaning equipment will be only by permit. Stoves and ranges will be manufactured only on monthly permits.

By eliminating unnecessary frills in scores of articles from hairpins to industrial power trucks, WPB in 1942 saved 600,000 tons of steel, 17,000 tons of copper, large quantities of other materials and enough man-hours to build 23 Liberty ships.

NAVY BUILDING SEVERAL HUNDRED SMALL DESTROYERS



ANOTHER "DE" craft—small destroyer—slides off the ways in an Orange, Texas, shipyard to join the battle against submarines on ocean supply lines. The navy program calls for several hundred of these convoy escort vessels described as "more powerful and effective than the corvette, but lacking some of the destroyer's power, speed and armament not essential to convoy duty." The vessel has displacement of 1300 tons, waterline length of 300 feet and beam of 35 to 36 feet. Armament includes guns "heavy enough to shoot it out with submarines," anti-aircraft guns, depth charges and torpedo tubes. Cost is approximately $3,500,000, about half that of a destroyer. NEA photo

Steel Group's Return on Investment Declines 3.4%

Decrease of 32.1 per cent in total net earnings of 33 companies classified as "iron and steel" is shown by comparison of their 1942 net, $197,704,000, with $291,196,000 in preceding year. Return on investment, lowest of all groups, fell 3.4 per cent in the period. Aggregate net income of the total manufacturing group, 710 companies tabulated by the National City Bank of New York, declined 13.4 per cent last year to $1,209,921,000 from 1941 total of $1,397,142,000. Net return dropped 2 per cent. Total metal products group, comprising 218 firms, showed 24.9 per cent decrease in earnings and net return down 2.3 per cent.

Reduced income was shown in every classification of the metal products industries except hardware and transportation.

Comparative net earnings of some industrial groups and per cent return on investment are presented in table, above, right, based on the bank's compilation.

DURABLE GOODS INDUSTRIES' EARNINGS COMPARED

(In Thousands of Dollars)

No.	Industrial Group	Net Income 1941	Net Income 1942	Per Cent Return 1941	Per Cent Return 1942
33	Iron and steel	$291,196	$197,704	9.5	6.1
10	Agricultural Implements	22,454	20,716	11.1	9.7
16	Building equipment	7,450	7,162	18.0	15.6
21	Electrical equipment	26,806	19,101	12.7	8.7
17	Hardware and tools	9,885	9,952	19.7	18.4
11	Household equipment	6,886	4,481	23.6	14.2
60	Machinery	45,004	42,775	21.1	18.2
8	Office equipment	13,944	12,475	22.8	18.4
9	Nonferrous metals	34,839	27,841	12.5	9.2
33	Misc. metal products	41,215	33,134	12.5	9.3
218	Total metal products	$499,679	$375,341	11.1	7.9
710	Total manufacturing	$1,397,142	$1,209,921	11.6	9.6

Republic's '42 Federal Tax Tops Total Paid Since 1930

In 1942 Republic Steel Corp., Cleveland, provided $67,875,000 for federal taxes on its income, an amount greater than the total of all federal income taxes paid by the corporation since its organization in 1930, four times the year's net profit of $17,154,000, seven times the amount paid to stockholders in dividends and half the total wages paid employes. Last year's federal taxes were 1½ times the 1941 total.

Net earnings in the latest period declined 29 per cent from preceding year, according to Republic's annual report, despite an 8 per cent increase in sales to $521,110,000. After paying $6 per share on each of corporation's two classes of preferred stocks, net was equal to $2.67 a share on the common, compared with $3.87 in 1941 when net earnings were $24,038,339. Common dividends aggregated $1.25 a share, against $2.00 in prior year. Total dividends were $9,104,963. Payrolls totaled $155,727,000, an all-time high and up $15,600,000 from year before.

Corporation operated at 99.6 per cent of capacity last year and produced 8,597,206 tons of steel, both all-time records, increasing production of electric furnace steels for airplanes, tanks, combat cars and other types of war equipment by 57 per cent during 1942 and 700 per cent since 1939.

Republic's capital expenditures for construction and improvement amounted to $12,706,689, bringing the total for such expenditures in the past three years up to $52,000,000. Additional capacity costing approximately $165,000,000, financed

STEEL CONSUMERS' COMBINED NET DECLINES 23 PER CENT

AGGREGATE net income of 57 iron and steel consumers in 1942 was $177,023,883, compared with $237,925,839 in the preceding year, decrease of $60,901,956, or about 23 per cent. Increased taxes, larger reserves for contingencies and postwar adjustments and greater allowance for depletion and depreciation account in large part for the decline. Earnings, in many cases subject to renegotiation, are summarized in the accompanying tabulation:

	1942	1941
American Brake Shoe & Foundry Co., New York	$ 2,991,459	$ 3,194,873
American Can Co., New York	12,867,422	18,845,831
Addressograph-Multigraph Corp., Cleveland	1,593,842	1,667,400
Aro Equipment Corp., Chicago	372,309	210,436†
Atlas Tack Corp., Fairhaven, Mass.	121,886	190,964
American Radiator & Standard Sanitary Corp., New York	5,551,657	7,613,790
American Central Mfg. Co., Connersville, Ind.	469,177	115,338
American Air Filter Co. Inc., Louisville, Ky.	570,788	428,968*
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.	632,580	453,083
Buckeye Steel Castings Co., Lima, O.	807,057	930,287
Bastian-Blessing Co., Chicago	529,015	971,485
Bendix Aviation Corp., Detroit	12,464,196	15,267,988
Bellanca Aircraft Corp., New Castle, Del.	690,835	151,954
Continental Can Co., New York	5,052,955	7,469,683
Compo Shoe Machinery Corp., Boston	220,118	242,362
Caterpillar Tractor Co., Peoria, Ill.	7,002,449	7,784,483
Continental Motors Corp., Muskegon, Mich.	5,472,884	3,231,724
Carrier Corp., Syracuse, N. Y.	541,564	515,949*
Chicago Railway Equipment Co., Chicago	370,330	615,072
Chrysler Corp., Detroit	15,529,013	40,114,419
Chicago Flexible Shaft Co., Chicago	1,141,505	1,512,756
Divco-Twin Truck Co., Detroit	122,185	477,796
Dresser Mfg. Co., Bradford, Pa.	1,728,517	1,010,615*
Detroit Steel Products Co., Detroit	504,672	782,177
Foote Bros. Gear & Machine Corp., Chicago	914,453	533,294
Foote-Burt Co., Cleveland	153,351	457,256
Fairbanks, Morse & Co., Chicago	2,677,960	2,920,618
General American Transportation Corp.	3,405,368†	3,905,635
General Steel Castings Corp., Eddystone, Pa.	410,177	480,870
Gabriel Co., Cleveland	221,610	216,695
General Electric Co., Schenectady, N. Y.	45,082,000	57,197,000
Hajoca Corp., Philadelphia	380,628	651,123
Hoe & Co. Inc., R., New York	847,920	873,549
Harnischfeger Corp., Milwaukee	1,445,180	1,094,869
Iron Fireman Mfg. Co., Cleveland	491,646	652,462
Jaeger Machine Co., Columbus, O.	529,906	683,492
Lima Locomotive Works, Lima, O.	1,643,451	1,270,144
Muskegon Motor Specialties Co., Muskegon, Mich.	205,836	327,472
New Haven Clock Co., New Haven, Conn.	146,679	179,835
New York Air Brake Co., New York	1,040,000†	1,309,770
Noblitt-Sparks Industries Inc., Columbus, Ind.	861,098	1,095,438
National Acme Co., Cleveland	2,385,080	3,145,104
Oliver Farm Equipment Co., Chicago	1,639,983	1,659,639*
Ryan Aeronautical Co., San Diego, Calif.	556,444	669,603*
Sundstrand Machine Tool Co., Rockford, Ill.	1,428,940	1,171,893
Sparks-Withington Co., Jackson, Mich.	1,497,425	295,680
Savage Arms Corp., New York	1,641,967†	3,426,629
Stanley Works, New Britain, Conn.	1,976,777	2,479,515
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.	322,012	487,007
United States Hoffman Machinery Corp., New York	324,529	697,253
Underwood-Elliott-Fisher Co., New York	2,234,079	3,740,089
Vogt Mfg. Corp., Rochester, N. Y.	251,212	397,103
Westinghouse Air Brake Co., Wilmerding, Pa.	4,232,910	6,058,635
Westinghouse Electric & Mfg. Co., Pittsburgh	17,366,841	23,117,510
Warner & Swasey Co., Cleveland	1,960,848	3,929,859
Waco Aircraft Co., Troy, O.	133,759	192,107
Willys-Overland Motors Inc., Toledo, O.	1,265,399	809,258

†Preliminary. ‡11 Months. *10 Months.

and owned by the government but operated under lease by Republic, includes four new blast furnaces, two completed, an electric furnace steel plant and additional electric furnaces in present plants.

The report points out that more than 13,000 employes are now serving with the armed forces, making it necessary to shift employes in some cases and to train large numbers of new employes. Over 2000 supervisors and foremen have received special training in supervisory work to enable them better to instruct new employes or old employes on new work. In addition, 9000 workers have been given specialized training. The corporation now has about 4300 women employed on jobs formerly held by men.

Wickwire Spencer Steel Co.

Net earnings of Wickwire Spencer Steel Co., New York, for 1942 were $1,599,994, equivalent to $3.48 a share on company's stock after deducting contingency reserve of $500,000. This compares with 1941 net of $1,578,462, or $3.44 a share. Depreciation allowance last year totaled $557,841; social security, unemployment insurance and payroll taxes amounted to $367,981; provision for state and federal income taxes was $1,127,649, and for taxes other than those on income, $279,938. No provision was made for excess profits taxes because the aggregate credit available for 1942 income exceeds taxable income for that year, according to company's report. Current assets increased to $10,922,212, as compared with $9,025,648 at close of previous fiscal period.

Midvale Co.

Consolidated net income of the Midvale Co., Philadelphia, Pa., totaled $3,740,367 in 1942, contrasting with $3,304,050 in previous 12 months. Net amount includes $1,337,700 estimated postwar refund of excess profits tax and is after provision of a contingency reserve of $1,020,000, up 50 per cent from the total set aside for contingencies in 1941. Accruals for taxes of all kinds amounted to $15,955,767, equal to $26.59 per share, compared with corresponding 1941 figure of $12.74 per share. Net current assets at the year-end increased approximately 16 per cent to $13,035,927.

Alan Wood Steel Co.

Alan Wood Steel Co., Conshohocken, Pa., reports net income last year as $739,590, subject to renegotiation of war contracts but after all ordinary charges. In 1941 company had net profit of $1,051,772. Allowance for depreciation, depletion and amortization was $1,322,682; provision for general taxes totaled $504,731. State and federal income and excess profits taxes in 1942 amounted to $1,307,000, including credit of $78,000 for postwar refund, against $1,550,000 in prior year.

Johns-Manville "Reports to Public" on 1942 Earnings

Formal 1942 statement of the Johns-Manville Co., New York, N. Y., has been followed by a "report to the public" of six plainly phrased items by Lewis H. Brown, president.

"How American business operates and how it has grown to be our great bulwark of strength through fair reward for work and initiative, and the constant investment of new capital in new ideas and new machinery," Mr. Brown said, "is best reflected in annual reports of thousands of companies. And for this reason the company is reporting this year not only to its stockholders and employes but also to the public."

Briefly outlined is the company's distribution of income for 1942:

Used for all costs of doing business (except those shown below), including depreciation, depletion and reserves for war contingencies	$ 49½ million	46%
To employes for salaries and wages	$ 37 million	34%
To government for taxes	$ 16½ million	15%
To stockholders in dividends	$ 2 million	2%
Leaving in the business	$ 3½ million	3%
Total Income	$108½ million	100%

A marble madonna and child sculptured by Giovanni di Agostino and a double sheet of drawings by Michelangelo were contributed recently to the Cleveland Museum of Art in memory of the late Henry G. Dalton. George S. Kendrick and Harry D. Kendrick, nephews of Mr. Dalton, made the contribution. Mr. Dalton died Dec. 27, 1939. He was senior partner of Pickands, Mather & Co. and chairman of the board of the Youngstown Sheet & Tube Co.

DIRECT HIT—BUT STEEL STANDS!

STEEL framework is about all that remains of this warehouse in Casablanca which received a direct hit with a bomb during a heavy German air raid on Dec. 31. The devastating attack is reported to have taken a heavy toll in lives and property. Concrete and stone in this building crumbled but columns and roof trusses withstood the shock. NEA photo

War Needs Lift Output To All-Time Record

WAR needs, abetted by some seasonal demand, continued in the past week to lift output to new highs. Production for military purposes has reached a rate 300 per cent above a year ago, supporting the belief that a 57-billion-dollar goal in war expenditures can be achieved this year.

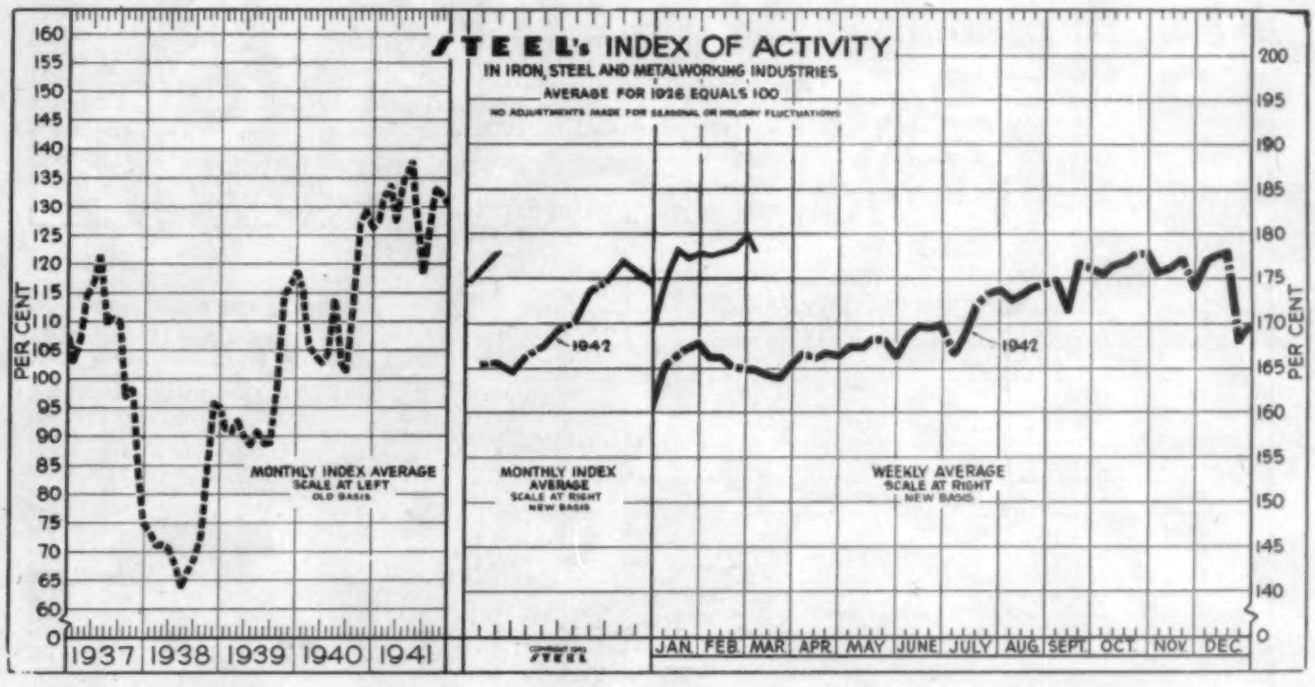
Into the making of industry's record has gone prodigious effort to conform to sweeping changes in requirements, to put to most efficient use machinery and labor. Standardization of components and substitution to conserve materials are well advanced, but uncertainties in the manpower situation disturb planners.

Receding only 0.1 point to 177.8 in the week ended March 6, STEEL's index of activity clings closely to the higher ground gained in mid-January. This barometer of industrial progress has consistently traced the upward trend, broken only by minor declines, since it touched 165.6 at the close of February, 1942.

Electric power output in the latest week rose to 3,946,630 kilowatt-hours from 3,893,796.

Machine tool output in January was valued at $117,432,000, reduction of 11 per cent from the December total, but still $33,885 above January, 1942. Report covers 26,000 new units produced by 384 companies. Recent statements by toolbuilders imply that the industry has passed the peak of war demand for its products.

Sharp restrictions on building have noticeably affected movement and bookings of structural steel. January shipments declined to 105,869 tons from 145,280 tons in December, and are close to the three-year low of first quarter 1940 when only 95,500 tons were shipped. Bookings likewise fell off, with 57,865 tons on order in January, against 67,600 for prior month and 183,400 in same month of preceding year.



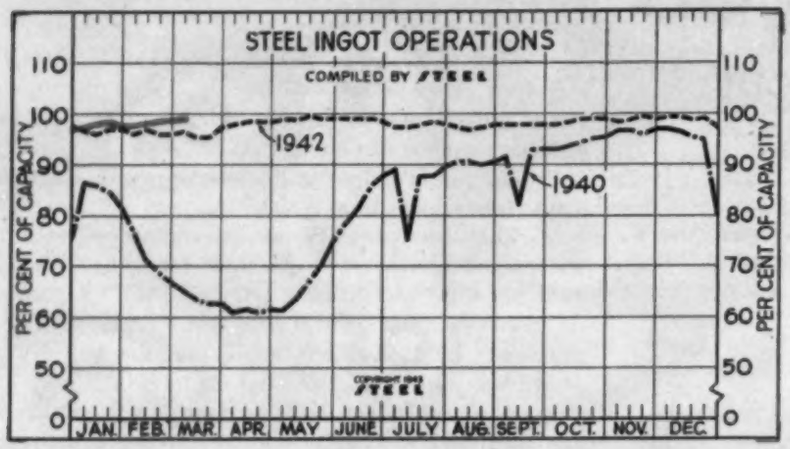
STEEL'S index of activity declined 0.1 point to 177.8 in the week ending Mar. 6:

Week Ended	1943	1942
Mar. 6	177.8†	164.8
Feb. 27	177.9	165.0
Feb. 20	178.0	165.1
Feb. 13	177.8	166.2
Feb. 6	177.6	166.3
Jan. 30	177.6	167.9
Jan. 23	177.2	167.4
Jan. 16	177.9	166.6
Jan. 9	175.7	165.8
Jan. 2	170.0	161.0
Ended	**1942**	**1941**
Dec. 26	167.8	120.5

†Preliminary.

Mo. Data	1943	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932
Jan.	173.7	165.7	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6
Feb.	177.8	165.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3
March		164.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2
April		166.7	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8
May		167.7	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8
June		169.4	136.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4
July		171.0	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1
Aug.		173.5	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0
Sept.		174.8	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5
Oct.		176.9	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4
Nov.		175.8	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5
Dec.		174.1	130.2	126.5	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2

Note: Weekly and monthly indexes for 1942 and 1943 have been adjusted to offset the forced curtailment in automobile production and to more accurately reflect expanding steel production



Steel Ingot Operations

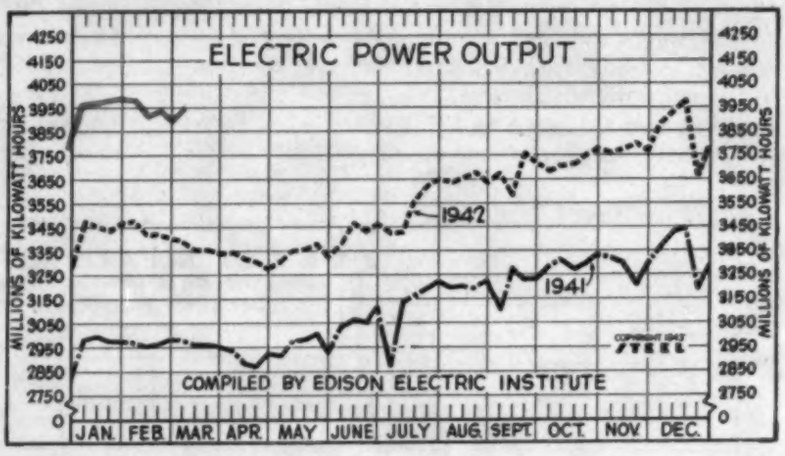
(Per Cent)

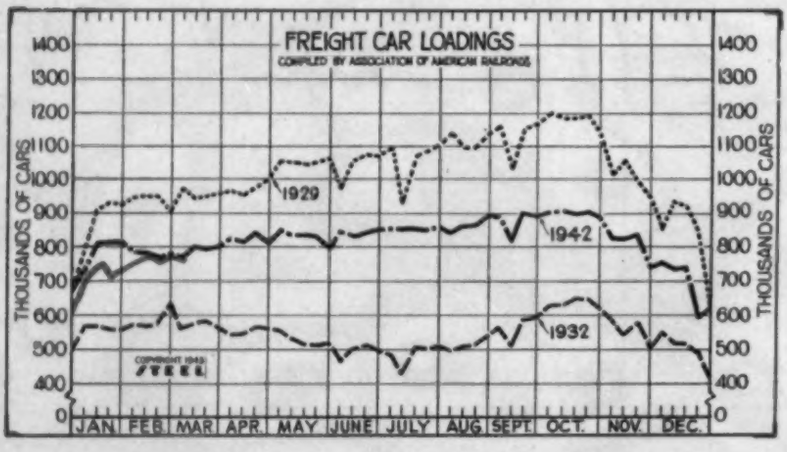
Week ended	1943	1942	1941	1940
Mar. 6	99.5	96.5	97.5	63.5
Feb. 27	99.5	96.0	96.5	65.5
Feb. 20	99.5	96.0	94.5	67.0
Feb. 13	99.0	97.0	96.5	69.0
Feb. 6	98.5	96.0	97.0	71.0
Jan. 30	98.5	97.0	97.0	76.5
Jan. 23	99.0	97.0	95.5	81.5
Jan. 16	99.0	96.0	94.5	84.5
Jan. 9	97.5	96.5	93.0	86.0
Jan. 2	97.5	97.5	92.5	86.5
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	99.0	93.5	80.0	75.5
Dec. 19	99.0	97.5	95.0	90.5
Dec. 12	99.5	97.5	95.5	92.5
Dec. 5	99.5	96.5	96.5	94.0
Nov. 28	99.0	95.0	97.0	94.0

Electric Power Output

(Million KWH)

Week ended	1943	1942	1941	1940
Mar. 6	3,946	3,392	2,835	2,464
Feb. 27	3,893	3,410	2,825	2,479
Feb. 20	3,949	3,424	2,820	2,455
Feb. 13	3,939	3,422	2,810	2,476
Feb. 6	3,960	3,475	2,824	2,523
Jan. 30	3,977	3,468	2,830	2,541
Jan. 23	3,974	3,440	2,980	2,661
Jan. 16	3,952	3,450	2,996	2,674
Jan. 9	3,953	3,473	2,985	2,688
Jan. 2	3,780	3,289	2,831	2,558
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	3,656	3,234	2,757	2,465
Dec. 19	3,976	3,449	3,052	2,712
Dec. 12	3,938	3,431	3,004	2,674
Dec. 5	3,884	3,368	2,976	2,654
Nov. 28	3,766	3,295	2,932	2,605


ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1942
1941
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.



Freight Car Loadings

(1000 Cars)

Week ended	1943	1942	1941	1940
Mar. 6	771†	771	742	621
Feb. 27	783	781	757	634
Feb. 20	752	775	678	595
Feb. 13	765	783	721	608
Feb. 6	755	784	710	627
Jan. 30	735	816	714	657
Jan. 23	709	818	711	649
Jan. 16	755	811	703	646
Jan. 9	716	737	712	668
Jan. 2	621	674	614	592
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	592	607	545	550
Dec. 19	743	799	700	655
Dec. 12	740	807	736	681
Dec. 5	760	833	739	657

†Preliminary.

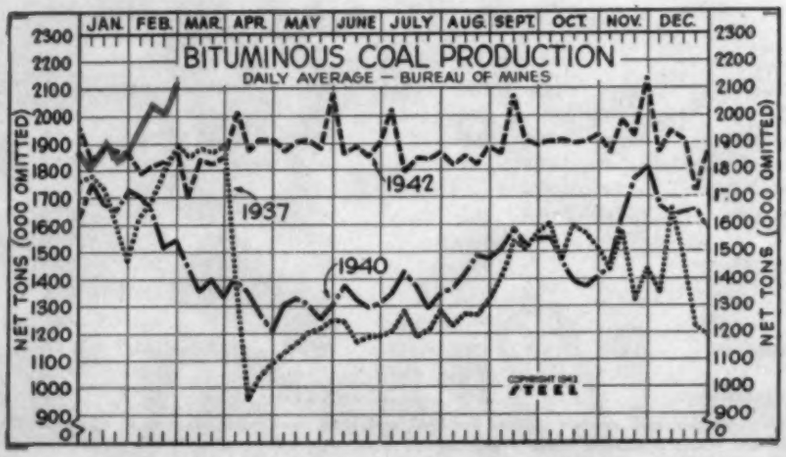
Bituminous Coal Production

Daily Average

Net Tons (000 omitted)

Week ended	1943	1942	1941	1937
Feb. 27	2,117†	1,878	1,736	1,897
Feb. 20	2,027	1,833	1,736	1,807
Feb. 13	2,033	1,817	1,736	1,696
Feb. 6	1,980	1,793	1,683	1,634
Jan. 30	1,900	1,866	1,684	1,466
Jan. 23	1,867	1,886	1,656	1,605
Jan. 16	1,929	1,883	1,609	1,731
Jan. 9	1,883	1,842	1,691	1,780
Jan. 2	1,860	1,960	1,762	1,764
Week ended	**1942**	**1941**	**1940**	**1937**
Dec. 26	1,714	1,632	1,591	1,230
Dec. 19	1,913	1,792	1,656	1,477

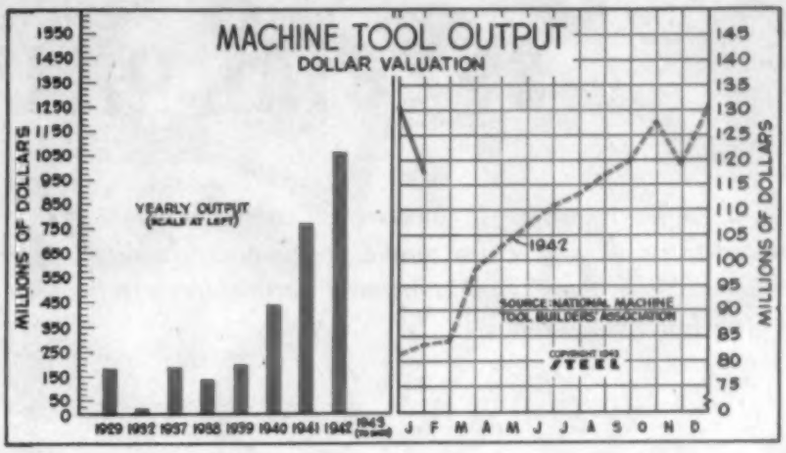
†Preliminary.

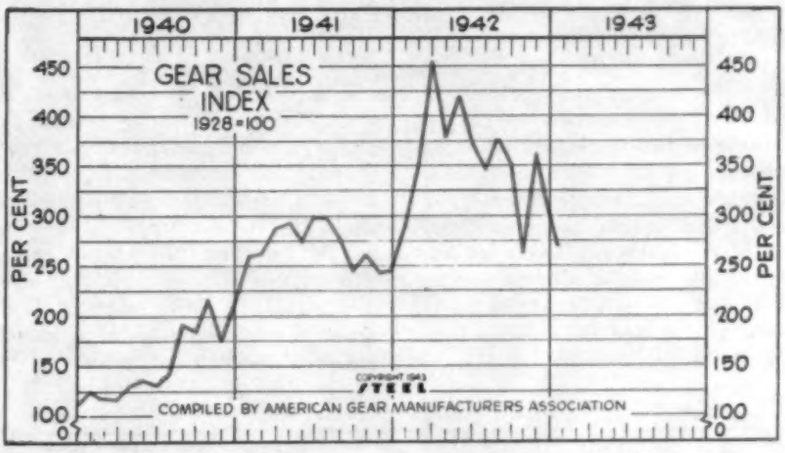

BITUMINOUS COAL PRODUCTION
DAILY AVERAGE — BUREAU OF MINES
NET TONS (000 OMITTED)
1942
1937
1940
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

Machine Tool Output
(000 omitted)

	1943	1942	1941
Jan.	$117,432	$83,547	$50,700
Feb.	...	84,363	54,000
Mar.	...	98,358	57,400
April	...	103,364	60,300
May	...	107,297	60,800
June	...	111,147	63,000
July	...	113,600	57,900
Aug.	...	117,343	64,300
Sept.	...	120,118	68,400
Nine Months	...	939,151	536,800
Oct.	...	128,800	77,200
Nov.	...	119,000	74,600
Dec.	...	131,960	81,435

Year	
1942	1,318,897
1941	775,300
1940	450,000
1939	210,000


MACHINE TOOL OUTPUT
DOLLAR VALUATION
MILLIONS OF DOLLARS
YEARLY OUTPUT
(SCALE AT LEFT)
1942
SOURCE NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION
1929 1932 1937 1938 1939 1940 1941 1942 1943
J F M A M J J A S O N D

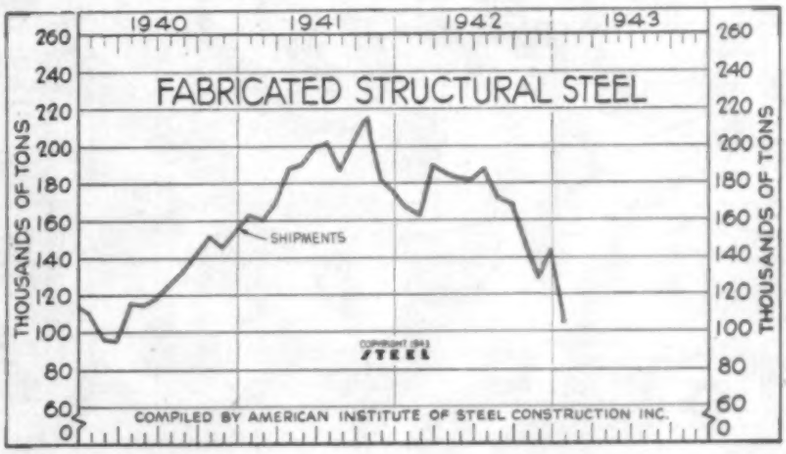


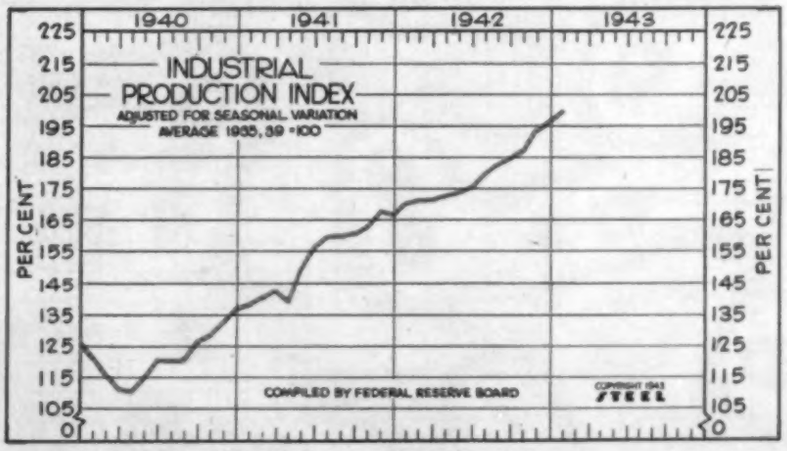
Gear Sales Index
(1928 = 100)

	1943	1942	1941	1940	1939
Jan.	268	288	259	123	91.0
Feb.	...	353	262	116	86.0
Mar.	...	455	288	114	104.0
April	...	378	292	128	88.0
May	...	421	273	133	93.0
June	...	373	299	129	90.0
July	...	344	298	141	89.0
Aug.	...	380	276	191	96.0
Sept.	...	351	248	183	126.0
Oct.	...	263	261	216	141.0
Nov.	...	359	241	173	126.0
Dec.	...	300	243	208	111.0
Ave.	...	355	269.6	155.0	103.0

Fabricated Structural Steel
(1000 tons)

	Shipments			Bookings		
	1943	1942	1941	1943	1942	1941
Jan.	105.7	167.8	164.6	57.8	183.4	281.2
Feb.	.....	164.6	161.4	.....	228.7	173.6
Mar.	.....	191.3	170.2	.....	248.3	206.1
Apr.	.....	187.2	189.8	.....	314.0	218.0
May	.....	184.2	191.9	.....	161.0	179.9
June	.....	182.7	200.5	.....	184.5	246.9
July	.....	189.9	203.0	.....	125.2	214.8
Aug.	.....	173.9	189.3	.....	80.6	158.7
Sept.	.....	169.8	204.1	.....	68.5	158.8
Oct.	.....	152.9	217.7	.....	50.9	128.7
Nov.	.....	130.4	182.6	.....	49.6	184.0
Dec.	.....	145.3	176.1	.....	67.6	146.4
Tot.	....	2031.1	2251.1	....	1755.8	2297.0





Industrial Production
Federal Reserve Board's Index
(1935-39 = 100)

	1943	1942	1941	1940	1939
Jan.	200	171	139	122	102
Feb.	...	172	141	116	101
March	...	172	143	112	101
April	...	173	140	111	97
May	...	174	150	115	97
June	...	176	157	121	102
July	...	180	160	121	104
Aug.	...	183	160	121	104
Sept.	...	185	161	127	113
Oct.	...	189	163	129	121
Nov.	...	194	168	133	124
Dec.	...	197	167	138	126
Year Ave.	...	181	154	122	108

SPECIAL ALLOY ADDITION A

. . . . permit reduction in amount of strategic alloying elements needed to produce specified tensile and impact properties; increase hardenability of the steel; also increase ductility in steels heat treated to high hardness levels

MATERIAL presented here was selected by the technical committee on alloy steel of the American Iron & Steel Institute, New York, from a large mass of data submitted by manufacturers of special alloy addition agents, steel manufacturers and consumers.

Much of this information was incomplete or inconclusive, due largely to nonuniform methods of recording data. Another group of data was wholly experimental and represented the development work which led to the commercial application of these agents. While these data are not recorded here, they played an important part in assisting the committee to arrive at the conclusion given.

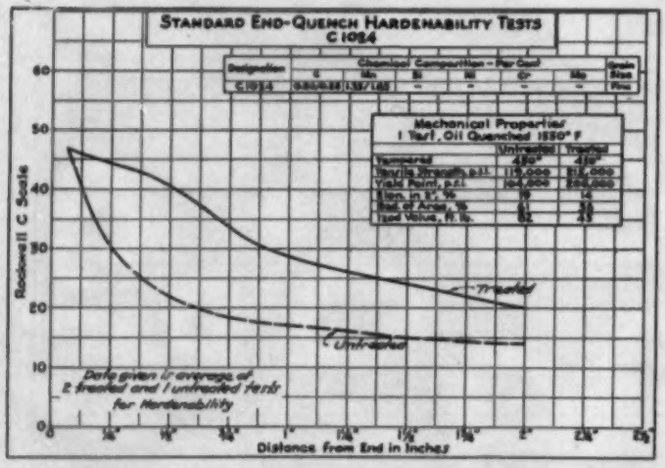
The data given herein were determined from production basic open-hearth heats and are intended to show the progress made in the art of using these agents and to guide prospective users in a qualitative manner; they are not intended to be used in establishing formal specifications.

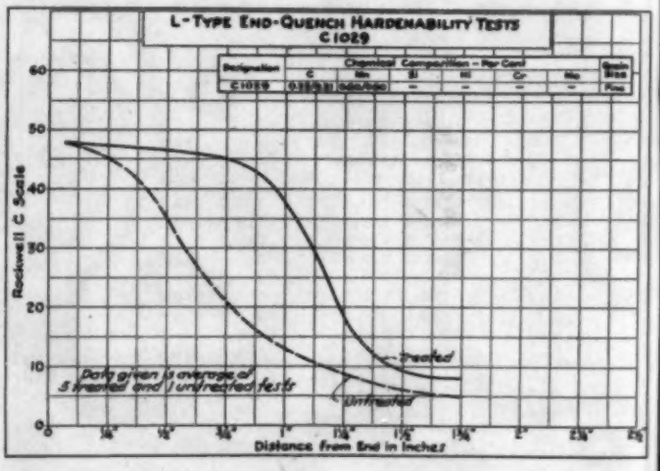
The nominal compositions of currently available special alloys are as in Table I.

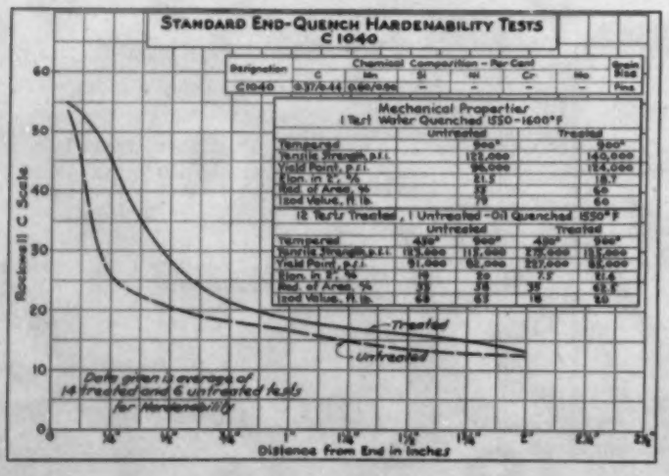
During the time this subject was being studied, other special alloy addition agents were developed; one, for example, an alloy with a nominal composition 1 to 6 per cent boron, 40 to 45 per cent silicon, and the balance iron. This agent is also available.

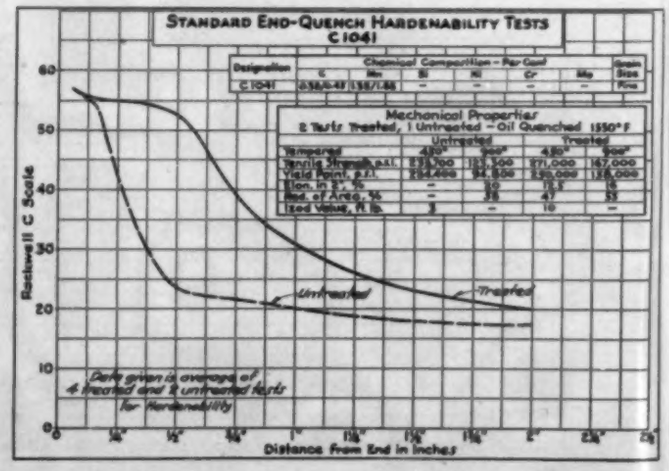
In the opinion of the committee, all the alloys listed are effective in producing the results noted when used in accordance with the recommendations of the alloy manufacturers. All the information presented here and all conclusions drawn and recommendations made pertain to special alloy addition agents which do not contain vanadium. In so far as possible, the hardenability curves and mechanical properties given are the average values obtained by the use of the alloy agents studied.

It is important to note that a large part of the available information consists of standard end-quench hardenability tests and mechanical property data on plain carbon and carbon-manganese steels; the reason for this, of course, lies in the effort to conserve strategic alloying elements through the use of these special alloy addition agents. There is information included on other grades of steel, which permits at least









N AGENTS

tentative general conclusions, although the amount of these data is relatively small and, in some instances, limited to single-heat results.

All the useful data have been set up on charts showing both hardenability and mechanical properties in order that comparisons may be simplified. Some contradictory data have been disclosed in this survey. But in certain instances, at least, these have been the result of addition methods or quantities added that have been either incorrect or contrary to the manufacturer's recommendations.

For example, the use of an insufficient rather than an adequate quantity of the special alloys may result in differences in properties that are no greater than the difference between the lower and upper limits of a customary chemical specification. Excess amounts may produce undesirable properties as described in more detail later. Despite these facts, it has been possible to use the data at hand to form tentative conclusions concerning properties imparted to steels by these special alloys. These tentative conclusions are summarized below:

Grain Size: All steels studies exhibited original fine grain characteristics according to the standard carburized austenitic grain size tests. In order to secure maximum effect from the special alloy additions they must be used following a steelmaking practice which will produce fine grain.

Hardenability: An increase in hardenability was observed in all of the data and was largely independent of the type of alloy added, provided the correct quantity was used and the method of addition was proper. The increase in hardenability varies with the type of steel to which the addition was made.

The rockwell hardness values of 30, 40 or 50 (distance from the quenched end) was 1½ to 3 times as great depending upon the base composition.

The effect of the special alloy additions on the various base compositions appears to be as follows:

Carburizing Steels (up to about 0.25 per cent carbon): In plain carbon steels the effect is mild. In higher manganese and alloy steels the effect is more pronounced.

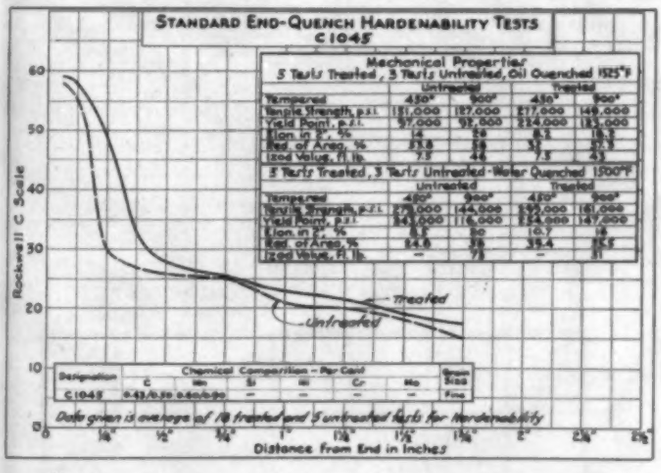
Medium Carbon Steels (about 0.30 to 0.60 per cent carbon): In plain carbon steels the effect is marked but varies, depending on manganese content. In the higher manganese and alloy steels these addition alloys appear to be most effective.

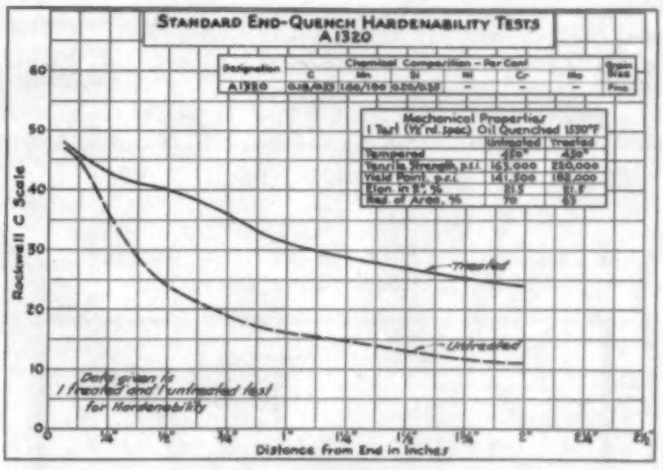
No conclusive data were available on the high-hardenability steels because of the limitations of the hardenability tests. All the hardenability data were obtained from the standard end-quench hardenability test bar except as otherwise noted.

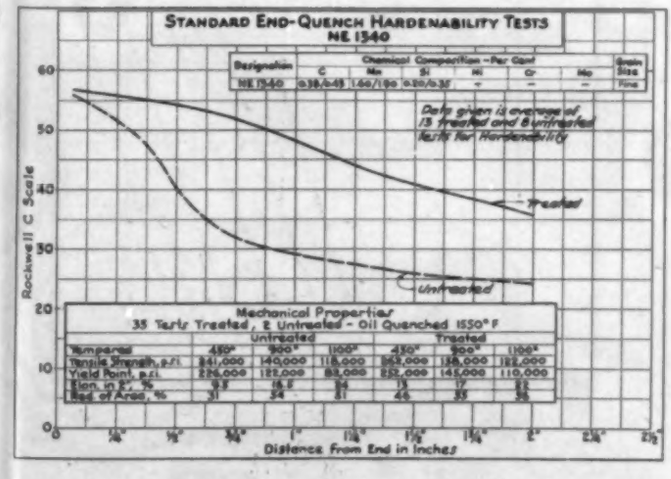
Mechanical Properties: The proper addition of the special alloys was beneficial, as indicated not only by an increase in hardenability but also a corresponding improvement in tensile properties. This improvement in hardenability was accompanied by an increase in strength in critical sections either with an increase in ductility and toughness or without normal corresponding loss in ductility and toughness, depending on the magnitude of the strength increase.

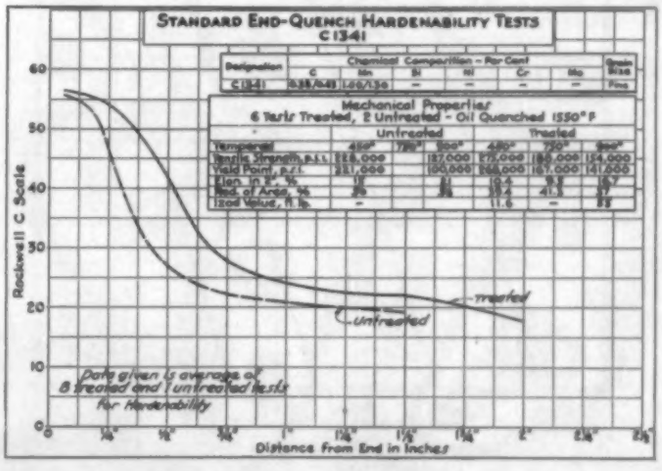
The improvement of the ratio of the yield to ultimate strength was greater

(*Please turn to Page* 117)









User Report No. 11 on Experience with . . .

NE (National Emergency) ALLOY STEELS

Medium Carbon NE-9440 and NE-9640 Steels

A LIST of the NE steels which are in the same class as NE-9440 and NE-9640 are shown in Table I. They are steels ranging in carbon content from 0.35 to 0.45 per cent. This list contains 16 steels which might have a carbon range between 0.35 and 0.45 per cent, many have, however, overlapping carbon and manganese contents.

The physical properties of these steels are compared with seven standard alloy compositions in Table II.

Tensile Properties: The tensile properties obtained from ASTM 0.5-inch test bars treated by quenching in oil from the temperatures commonly recommended for the particular alloy compositions are compared. Certain fundamentals should be understood for interpretation of the tensile data. They are:

—that the alloy compositions will have different hardnesses when tempered at a given temperature from the fully hardened condition, which is another way of saying that elements or combinations of elements resist softening by tempering to a greater degree than others. The elements which impart the greatest resistance to softening by tempering are molybdenum and chromium and to a lesser degree manganese.

—that the alloy compositions when heat treated by quenching and tempering in 0.005-inch sections will have approximately the same tensile strength for the same hardness.

—that the alloy compositions have different elongation or reduction-of-area values for the same hardness. Those containing nickel have higher values for the same tensile strength and those containing the higher percentages of manganese and chromium, the least. It is common belief that a greater degree of toughness or resistance to failure by impact.

Effect of Tempering Temperature: It should be understood that carbon has an effect in resisting softening by tempering even within a carbon variation of 0.10 per cent which is the extent of the variation covered by the data herein. Figs. 1 and 2 illustrate the effect of carbon with the same alloy composition.

Figs. 3 and 4 give the tensile properties of NE-9440 and NE-9640 after quenching and tempering at various temperatures.

Fig. 5 gives the effect of the tempering temperature on the hardness of NE-9440, NE-9640, four other NE alloy compositions and seven standard alloy compositions.

It appears from Fig. 5 that NE-9440 and NE-9640 are comparable with the majority of the standard alloy compositions but the hardness of NE-9440 and NE-9640 appear to fall off rather rapidly at a temperature of 900 degrees Fahr. when compared with SAE-3140, 4140, 4340, 4640 and 5140.

Relation of Tensile Strength to Hardness: Fig. 6 shows that all the steels have approximately the same hardness for a given tensile strength which indicates that the 0.500-inch bars were

Fig. 1—Effect of carbon content on temperature required to produce various hardnesses in the 4000 series molybdenum steels

Fig. 2—Effect of carbon content on temperature required to produce various hardnesses in the 6100 series chromium-vanadium steels

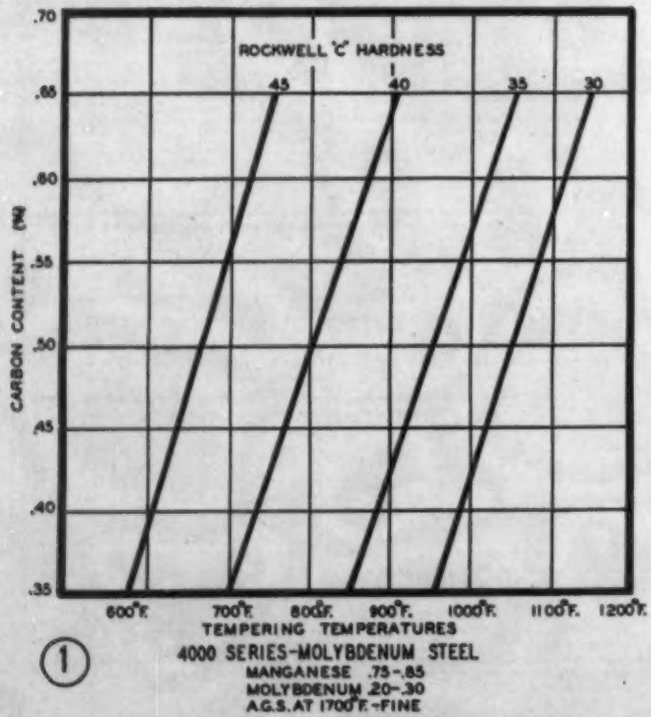
Fig. 3—Tensile properties of NE-9440 steel

Fig. 4—Tensile properties of NE-9460 steel

Fig. 5—Effect of various tempering temperatures on hardness; 6 NE steels; 7 AISI steels

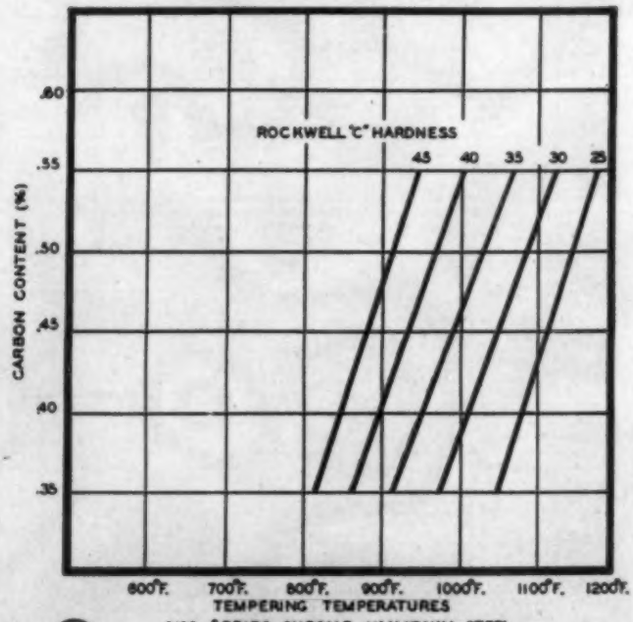
Fig. 6—Hardness versus tensile strength of the same 13 steels as in Fig. 5

THE EFFECT OF THE CARBON CONTENT ON THE TEMPERATURE REQUIRED TO PRODUCE VARIOUS HARDNESSES.



① 4000 SERIES-MOLYBDENUM STEEL
MANGANESE .75-.85
MOLYBDENUM .20-.30
A.G.S. AT 1700°F.-FINE

THE EFFECT OF THE CARBON CONTENT ON THE TEMPERATURE REQUIRED TO PRODUCE VARIOUS HARDNESSES



② 6100 SERIES CHROME-VANADIUM STEEL
MANGANESE .75-.80
CHROMIUM .90-1.00
VANADIUM .15-.20
A.G.S. AT 1700°F.-FINE

By A. S. JAMESON
Works Metallurgist
West Pullman Works
International Harvester Co.
Chicago

For information on development of NE steels and their properties, see STEEL, Feb. 9, 1942, p. 70; March 16, p. 72; June 8, p. 66; June 15, p. 66; July 13, p. 80; July 20, p. 86; Aug. 3, p. 70; Aug. 17, p. 40; Aug. 31, p. 41, p. 76; Sept. 7, p. 78; Oct. 19, p. 66; Nov. 9, p. 96; Dec. 28, p. 27; Jan. 25, 1943, p. 84; Feb. 22, p. 102. March 1, p. 94; March 15, p. 94.

For reports from users of NE steels, see Nov. 16, 1942, p. 106; Nov. 23, p. 90; Nov. 30, p. 62; Dec. 7, p. 112; Dec. 14, p. 99; Dec. 21, p. 70; Jan. 11, 1943, p. 60; Jan. 18, p. 66; Feb. 1, p. 100; March 8, p. 109.

For latest revised list of NE alloy steels, see March 1, p. 94.

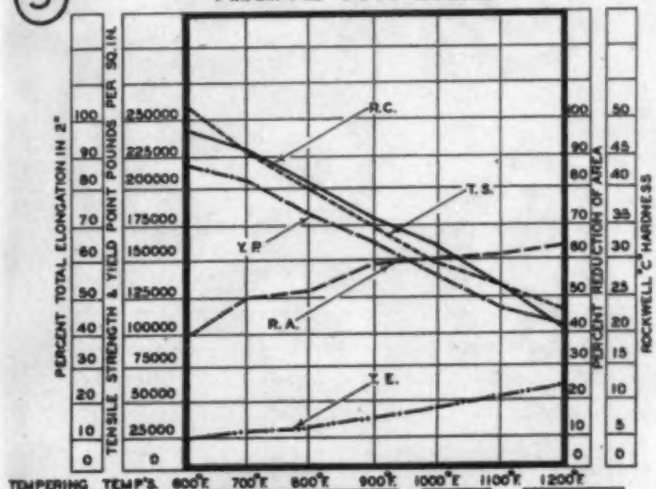
For list of NE CARBON steels, see March 8, p. 90.

For list of AMS (Aircraft Materials Specification) steels, see Sept. 7, 1942, p. 78.

For details of WD (War Department) steels, and complete listing, see Feb. 8, 1943, p. 80.

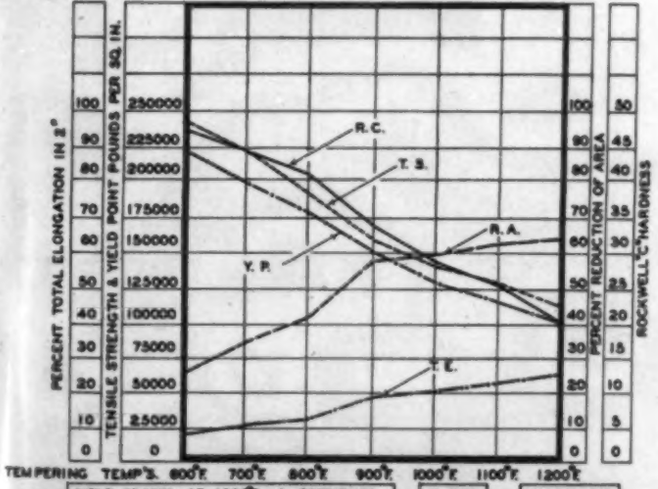
(3)

TENSILE PROPERTIES OF A.I.S.I. NE-9440 STEEL


PERCENT TOTAL ELONGATION IN 2"
TENSILE STRENGTH & YIELD POINT POUNDS PER SQ. IN.
PERCENT REDUCTION OF AREA
ROCKWELL "C" HARDNESS
R.C.
T.S.
Y.P.
R.A.
T.E.
TEMPERING TEMP'S. 600°F. 700°F. 800°F. 900°F. 1000°F. 1100°F. 1200°F.
HELD 40 MIN. AT 1550°F & QUENCHED IN OIL. TEMPERED AT THE INDICATED TEMPERATURES.
ST'D .500"D. TENSILE TEST SPECIMEN
S-751
C - .42
MN - .98
SI - .48
NI - .30
CR - .34
MO - .13
AUSTENITIC GRAIN SIZE 7 AT 1700°F.

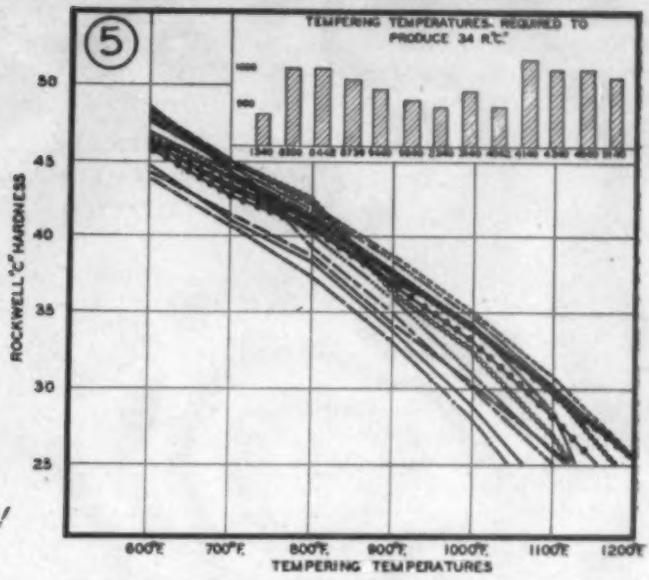
(4)

TENSILE PROPERTIES OF A.I.S.I. NE-9640 STEEL



(5)

THE EFFECT OF THE TEMPERING TEMPERATURE ON THE HARDNESS AFTER TEMPERING AT VARIOUS TEMPERATURES

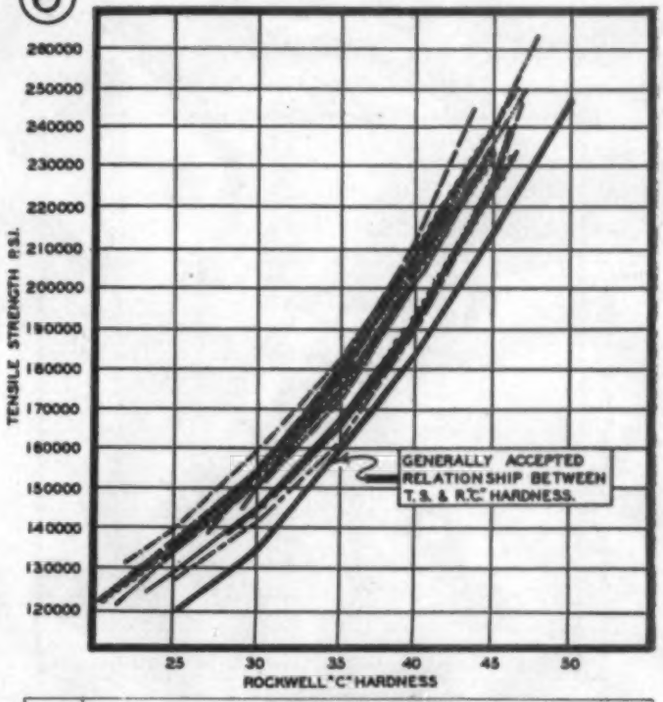

TEMPERING TEMPERATURES REQUIRED TO PRODUCE 34 R.C.
ROCKWELL "C" HARDNESS
TEMPERING TEMPERATURES
600°F. 700°F. 800°F. 900°F. 1000°F. 1100°F. 1200°F.

CODE	STEEL	CARBON	MANGANESE	SILICON	NICKEL	CHROMIUM	MOLYBDENUM
	NE-1340	.38	1.73	.22			
	NE-8339	.40	1.59	.29			.28
	NE-8442	.44	1.35	.26			.33
	NE-8739	.41	.93	.24	.53	.52	.26
	NE-9440	.42	1.14	.53	.29	.33	.10
	NE-9640	.39	1.38	.50		.48	
	A-2340	.39	.79	.22	3.71		
	A-3140	.41	.64	.19	1.27	.60	
	A-4042	.44	.85	.26			.22
	A-4140	.42	.77	.26		1.00	.24
	A-4340	.43	.54	.21	1.68	.66	.25
	A-4640	.41	.72	.26	1.74		.24
	A-5140	.39	.88	.26		1.05	

AUSTENITIC GRAIN SIZE-FINE
OIL QUENCHED FROM 1525-1550°F IN .525" TEST BAR SIZE

(6)

HARDNESS VS. TENSILE STRENGTH



CODE	STEEL	CARBON	MANGANESE	SILICON	NICKEL	CHROMIUM	MOLYBDENUM
	NE-1340	.38	1.73	.22			
	NE-8339	.40	1.59	.29			.28
	NE-8442	.44	1.35	.26			.33
	NE-8739	.41	.93	.24	.53	.52	.26
	NE-9440	.42	1.14	.53	.29	.33	.10
	NE-9640	.39	1.38	.50		.48	
	A-2340	.39	.79	.22	3.71		
	A-3140	.41	.64	.19	1.27	.60	
	A-4042	.44	.85	.26			.22
	A-4140	.42	.77	.26		1.00	.24
	A-4340	.43	.54	.21	1.68	.66	.25
	A-4640	.41	.72	.26	1.74		.24
	A-5140	.39	.88	.26		1.05	

AUSTENITIC GRAIN SIZE-FINE
OIL QUENCHED FROM 1525-1550°F IN .525" TEST BAR SIZE

hardened uniformly from outside to center.

Relationship of Tensile Strength to Reduction of Area: Fig. 7 gives the relationship between tensile strength and reduction of area. The reduction-of-area value for a given hardness show a wide spread. It will be noted that the values for the steels are closer together for a tensile strength of 155,000 pounds per square inch and wider apart at the tensile strength of 200,000 pounds per square inch. This indicates that in order to obtain the best combination of strength with toughness the choice of

TABLE I—Chemical Ranges of Certain NE Steels

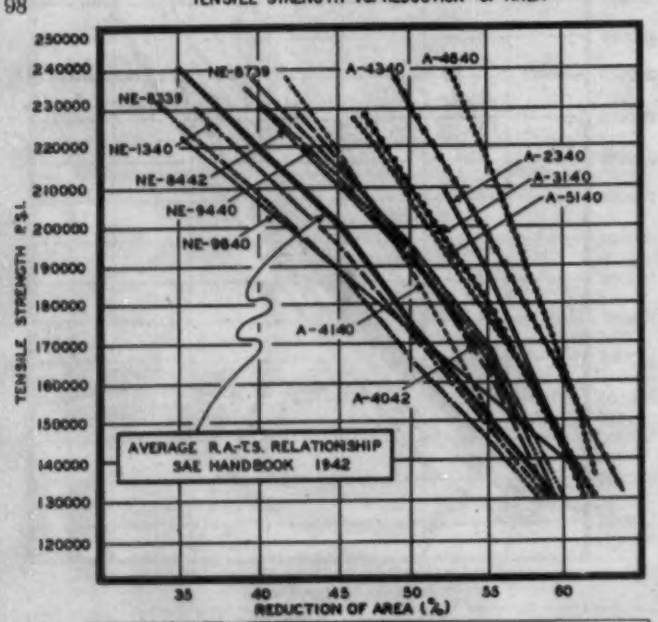
Steel Symbol	Alloy Class	Carbon Min.	Carbon Max.	Manganese Min.	Manganese Max.	Silicon Min.	Silicon Max.	Nickel Min.	Nickel Max.	Chromium Min.	Chromium Max.	Molybdenum Min.	Molybdenum Max.
NE-1335		.33	.38	1.60	1.90	.20	.35	...	...	...	...	...	...
NE-1340	Manganese	.38	.43	1.60	1.90	.20	.35	...	...	...	...	...	...
NE-1345		.43	.48	1.60	1.90	.20	.35	...	...	...	...	...	...
NE-8339	Manganese	.37	.42	1.30	1.60	.20	.35	...	...	...	...	.20	.30
NE-8442	Molybdenum	.40	.45	1.30	1.60	.20	.35	...	...	...	...	.30	.40
NE-8735	Nickel	.33	.38	.70	.90	.20	.35	.40	.60	.40	.60	.20	.30
NE-8739	Chromium	.35	.40	.70	.90	.20	.35	.40	.60	.40	.60	.20	.30
NE-8744	Molybdenum	.40	.45	.70	.90	.20	.35	.40	.60	.40	.60	.20	.30
NE-9435	Manganese	.33	.38	.90	1.20	.40	.60	.20	.40	.20	.40	.08	.15
NE-9437	Silicon	.35	.40	.90	1.20	.40	.60	.20	.40	.20	.40	.08	.15
NE-9440	Chromium	.38	.43	.90	1.20	.40	.60	.20	.40	.20	.40	.08	.15
NE-9442	Nickel	.40	.45	1.00	1.30	.40	.60	.20	.40	.20	.40	.08	.15
NE-9445	Molybdenum	.43	.48	1.00	1.30	.40	.60	.20	.40	.20	.40	.08	.15
NE-9635	Manganese	.33	.38	1.20	1.50	.40	.60	...	...	.40	.60	...	...
NE-9637	Silicon	.35	.40	1.20	1.50	.40	.60	...	...	.40	.60	...	...
NE-9640	Chromium	.38	.43	1.20	1.50	.40	.60	...	...	.40	.60	...	...

TABLE II—Chemical Ranges of Standard Alloy Compositions for Which NE-9440 and 9640 Could Be Considered As Substitutes

Steel Symbol	Alloy Class	Carbon Min.	Carbon Max.	Manganese Min.	Manganese Max.	Silicon Min.	Silicon Max.	Nickel Min.	Nickel Max.	Chromium Min.	Chromium Max.	Molybdenum Min.	Molybdenum Max.
A-2340	Nickel	.38	.43	.70	.90	.20	.35	3.25	3.75	...	...	...	...
A-3140	Nickel Chromium	.38	.43	.70	.90	.20	.35	1.10	1.40	.55	.75	...	...
A-4042	Molybdenum	.40	.45	.75	1.00	.20	.35	...	...	...	...	.20	.30
A-4140	Chromium Molybdenum	.38	.43	.75	1.00	.20	.35	...	...	.80	1.10	.15	.25
A-4340	Nickel Chromium Molybdenum	.38	.43	.60	.80	.20	.35	1.65	2.00	.70	.90	.20	.30
A-4640	Nickel Molybdenum	.38	.43	.60	.80	.20	.35	1.65	2.00	...	...	.20	.30
A-5140	Chromium	.38	.43	.70	.90	.20	.35	.	.	.70	.90	.	.

Fig. 7—Tensile strength versus reduction of area

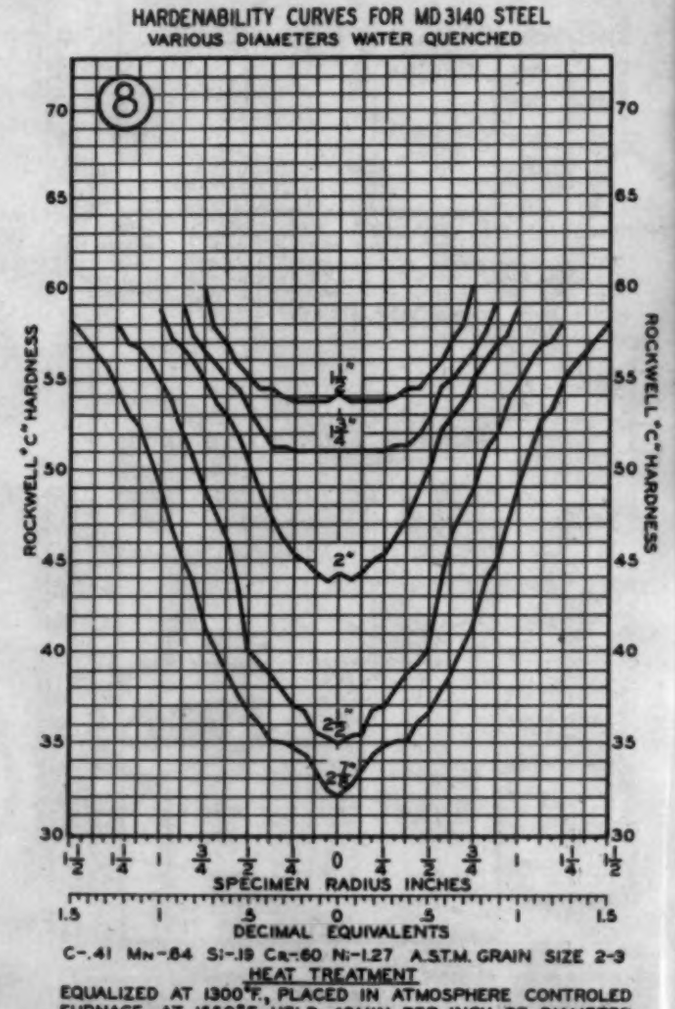
Fig. 8—A typical set of hardenability curves showing hardness across sections



STEEL	CHEMICAL COMPOSITION CARBON	MANGANESE	SILICON	NICKEL	CHROMIUM	MOLYBDENUM
NE-1340	.38	1.73	.22			
NE-8339	.40	1.59	.29			.28
NE-8442	.44	1.35	.26			.33
NE-8739	.41	.93	.24	.53	.52	.26
NE-9440	.42	1.14	.53	.29	.33	.10
NE-9640	.39	1.38	.50		.46	
A-2340	.39	.79	.22	3.71		
A-3140	.41	.64	.19	1.27	.60	
A-4042	.44	.83	.26			.22
A-4140	.42	.77	.26		1.00	.24
A-4340	.43	.84	.21	1.68	.86	.25
A-4640	.41	.72	.26	1.74		.24
A-5140	.39	.88	.26		1.05	

AUSTENITIC GRAIN SIZE - FINE
OIL QUENCHED FROM 1525-1550°F IN .525" TEST BAR SIZE

(7)



C-.41 Mn-.84 Si-.19 Cr-.60 Ni-1.27 A.S.T.M. GRAIN SIZE 2-3

HEAT TREATMENT

EQUALIZED AT 1300°F., PLACED IN ATMOSPHERE CONTROLED FURNACE AT 1550°F., HELD 40MIN. PER INCH OF DIAMETER AND QUENCHED IN WATER (70-80°F.). BAR NO. S-341. LENGTH OF SPECIMEN 3 x DIA.

Green worker—but he's safe!

He's a new man in a vital war plant . . . working long hours . . . sometimes forgetting to be careful. Here is a real job for "A.W." Rolled Steel Floor Plate—to stop the alarming increase in slipping and falling accidents, to end floor troubles for good. "A.W." Floor Plate protects men essential in the war effort wherever they may be. Fire-proof, heat-proof, oil-proof, crack-proof. Write for folder.

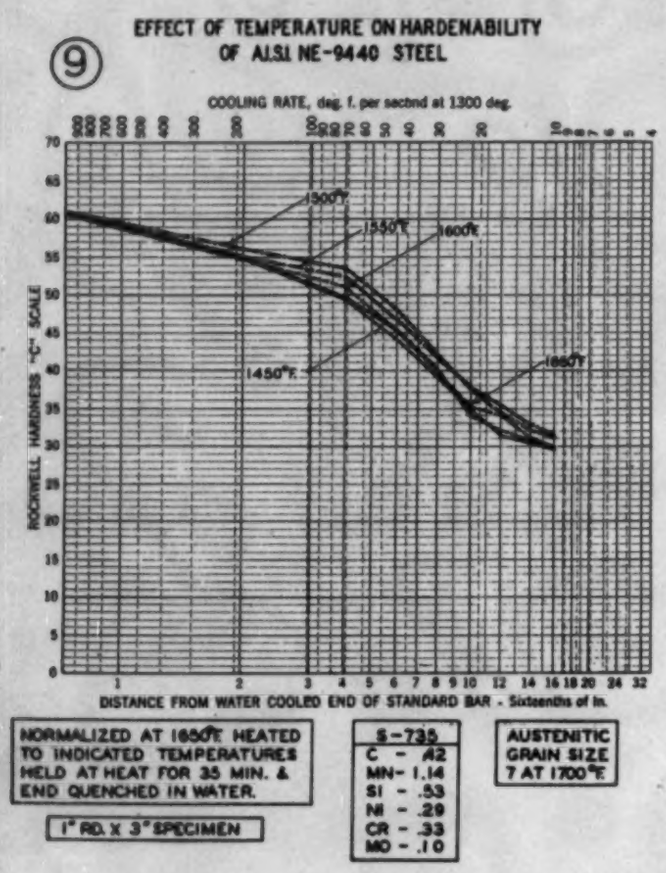
Other products include Plates, Sheets, Billets, Blooms, Slabs—Carbon, Copper or Alloy analyses.

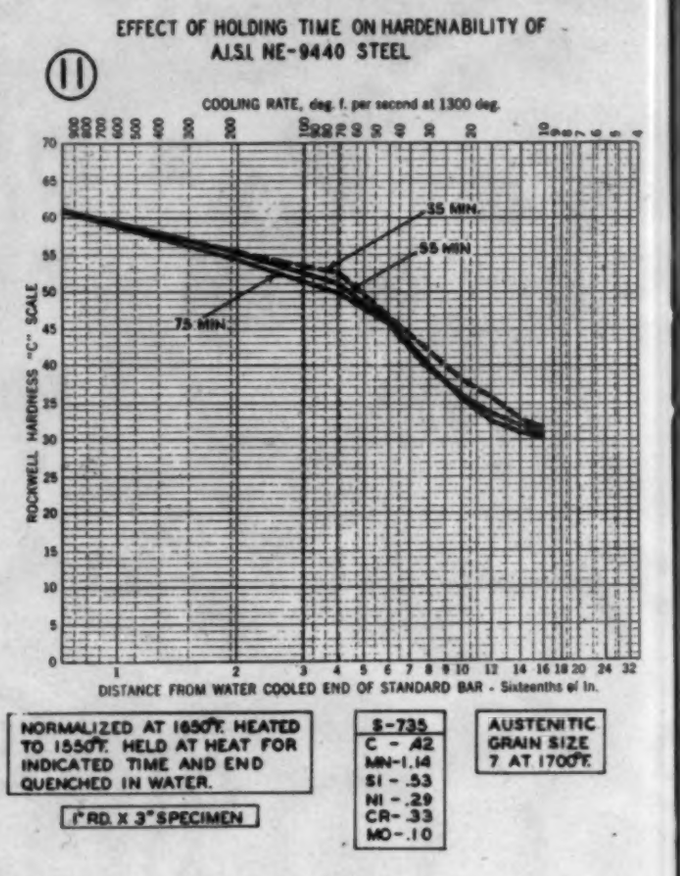
ALAN WOOD STEEL COMPANY

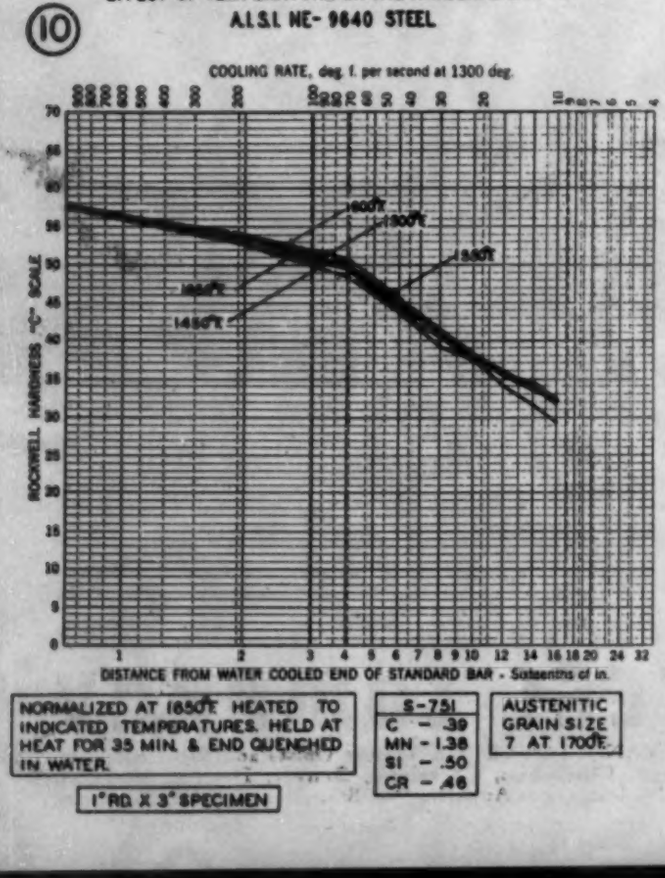
MAIN OFFICE AND MILLS: CONSHOHOCKEN, PENNSYLVANIA : SINCE 1826. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N. C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

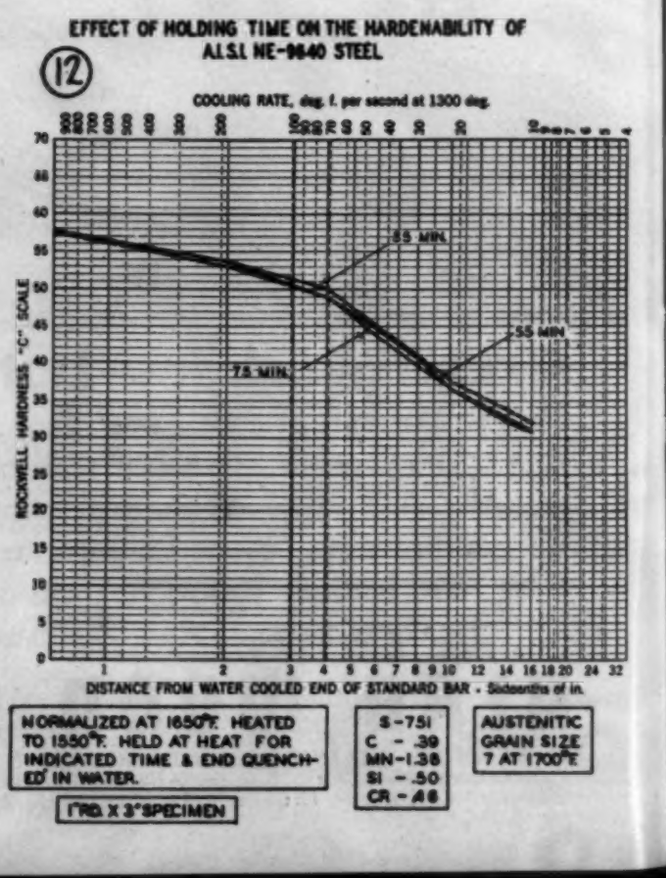
an alloy analysis would depend on the hardness level at which the steel was to be used. Where high tensile strength, say 200,000 pounds per square inch, is desired (which represents a hardness range of 38 to 42 rockwell C), steel compositions such as are represented by SAE-2340, 3140, 4340 or 4640, (containing 1 per cent or more of nickel) would be most desirable. The least desirable would be NE-8339, 8442, 1340 and NE-9640. Intermediate would be

Fig. 9—Effect of temperature on hardenability of NE-9440. Fig. 10—Effect of temperature on hardenability of NE-9640. Fig. 11—Effect of holding time on hardenability of NE-9440. Fig. 12—Effect of holding time on hardenability of NE-9640


9
EFFECT OF TEMPERATURE ON HARDENABILITY OF A.I.S.I. NE-9440 STEEL
COOLING RATE, deg. f. per second at 1300 deg.
ROCKWELL HARDNESS "C" SCALE
1300°F.
1550°F.
1600°F.
1450°F.
1650°F.
DISTANCE FROM WATER COOLED END OF STANDARD BAR - Sixteenths of in.
NORMALIZED AT 1650°F. HEATED TO INDICATED TEMPERATURES HELD AT HEAT FOR 35 MIN. & END QUENCHED IN WATER.
1" RD. X 3" SPECIMEN
S-735
C - .42
MN - 1.14
SI - .53
NI - .29
CR - .33
MO - .10
AUSTENITIC GRAIN SIZE 7 AT 1700°F.


11
EFFECT OF HOLDING TIME ON HARDENABILITY OF A.I.S.I. NE-9440 STEEL
COOLING RATE, deg. f. per second at 1300 deg.
ROCKWELL HARDNESS "C" SCALE
35 MIN.
55 MIN
75 MIN.
DISTANCE FROM WATER COOLED END OF STANDARD BAR - Sixteenths of in.
NORMALIZED AT 1650°F. HEATED TO 1550°F. HELD AT HEAT FOR INDICATED TIME AND END QUENCHED IN WATER.
1" RD. X 3" SPECIMEN
S-735
C - .42
MN-1.14
SI - .53
NI - .29
CR- .33
MO-.10
AUSTENITIC GRAIN SIZE 7 AT 1700°F.


10
EFFECT OF TEMPERATURE ON THE HARDENABILITY OF A.I.S.I. NE-9640 STEEL
COOLING RATE, deg. f. per second at 1300 deg.
ROCKWELL HARDNESS "C" SCALE
1600°F.
1500°F.
1550°F.
1650°F.
1450°F.
DISTANCE FROM WATER COOLED END OF STANDARD BAR - Sixteenths of in.
NORMALIZED AT 1650°F. HEATED TO INDICATED TEMPERATURES. HELD AT HEAT FOR 35 MIN. & END QUENCHED IN WATER.
1" RD. X 3" SPECIMEN
S-751
C - .39
MN - 1.38
SI - .50
CR - .46
AUSTENITIC GRAIN SIZE 7 AT 1700°F.


12
EFFECT OF HOLDING TIME ON THE HARDENABILITY OF A.I.S.I. NE-9640 STEEL
COOLING RATE, deg. f. per second at 1300 deg.
ROCKWELL HARDNESS "C" SCALE
35 MIN.
55 MIN
75 MIN.
DISTANCE FROM WATER COOLED END OF STANDARD BAR - Sixteenths of in.
NORMALIZED AT 1650°F. HEATED TO 1550°F. HELD AT HEAT FOR INDICATED TIME & END QUENCHED IN WATER.
1" RD. X 3" SPECIMEN
S-751
C - .39
MN-1.38
SI - .50
CR - .46
AUSTENITIC GRAIN SIZE 7 AT 1700°F.

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4042, 4140, 8739 and 9440.

At a tensile value of 155,000 pounds per square inch which represents a hardness range of 29 to 33 rockwell C, the steels all have a reduction-of-area value of at least 50 per cent which is a desirable value and indications that all of the alloy compositions would be satisfactory within this hardness range.

Alloying elements have their greatest effect on the hardenability of a steel where hardenability is defined as the depth to which the hardness penetrates through towards the center of a quenched bar. Hardness penetration is often measured by hardness readings taken on a cross section of quenched cylindrical bars as illustrated in Fig. 8 which shows hardness penetration for various diameters of A-3140 steel. However, it is now customary to use the end-quench specimen.

This end-quench specimen and details

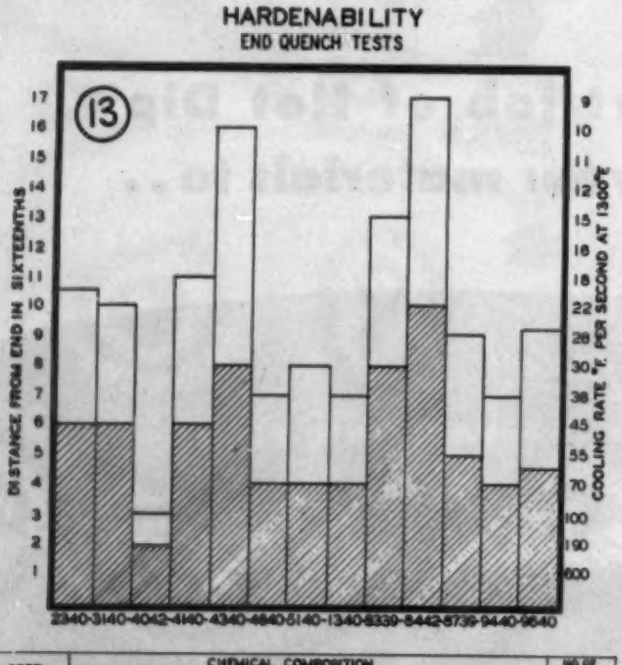
(*Please turn to Page* 136)

TABLE III—Hardenability in Terms of Bar Size

Steel Symbol	Hardenability J-50	Cooling Rate	Water Maximum Bar Size (Inches) to Which Tensile Properties Would Apply	Oil Maximum Bar Size (Inches) to Which Tensile Properties Would Apply
A-2340	6	45	1½	1
A-3140	6	45	1½	1
A-4042	2	190	½	¼
A-4140	6	45	1½	1
A-4340	8	30	2	1¼
A-4640	4	70	1¼	⅝
A-5140	4	70	1¼	⅝
NE-1340	4	70	1¼	⅝
NE-8339	8	30	2	1¼
NE-8442	10	22	2½	1⅝
NE-8739	5	55	1⅝	⅞
NE-9440	4	70	1¼	⅝
NE-9640	5	55	1⅝	⅞

TABLE IV—Method of Manufacture, Material and Heat Treatment Data On Items in Fig. 14 Made From NE-9440 Steel

Diagram No.	Method of Manufacture	Material Size	Material Condition	Heat Treatment	NE-9440 Replaces
1	Forging	1 ⅜" Rd.	Hot Rolled	Hardened and tempered to 269-302 Brinell	A-4640
2	Forging	⅞" Rd.	Hot Rolled	Hardened and tempered to 229-299 Brinell (See Notes)	A-3140 A-4042 A-4140
3	Automatic Screw Machine	2½" Rd.	Annealed and Turned	Hardened and tempered to 40-45 Rockwell C	A-4063
4	Automatic Screw Machine	1⅝" Rd.	Annealed and Cold Drawn	Hardened and tempered to 26-32 Rockwell C (See Notes)	A-2340
5	Hot Formed or Hot Upset	½" Rd.	Hot Rolled	Hardened and tempered to 26-36 Rockwell C (See Notes)	A-4042 A-3140
6	Automatic Screw Machine	⅝" Rd.	Annealed and Cold Drawn	Hardened and tempered to 26-36 Rockwell C	A-4042 A-3135 A-4140
7	Automatic Screw Machine	.390" Rd.	Annealed and Cold Drawn	Hardened and tempered to 26-36 Rockwell C	A-4640 A-4340
8	Automatic Screw Machine	25/64" Rd.	Annealed and Cold Drawn	Hardened and tempered to 38-42 Rockwell C	A-2330
9	Automatic Screw Machine	1-324"/320" Rd.	Annealed and Cold Drawn	Hardened and tempered to 30-36 Rockwell C (See Notes)	A-2340

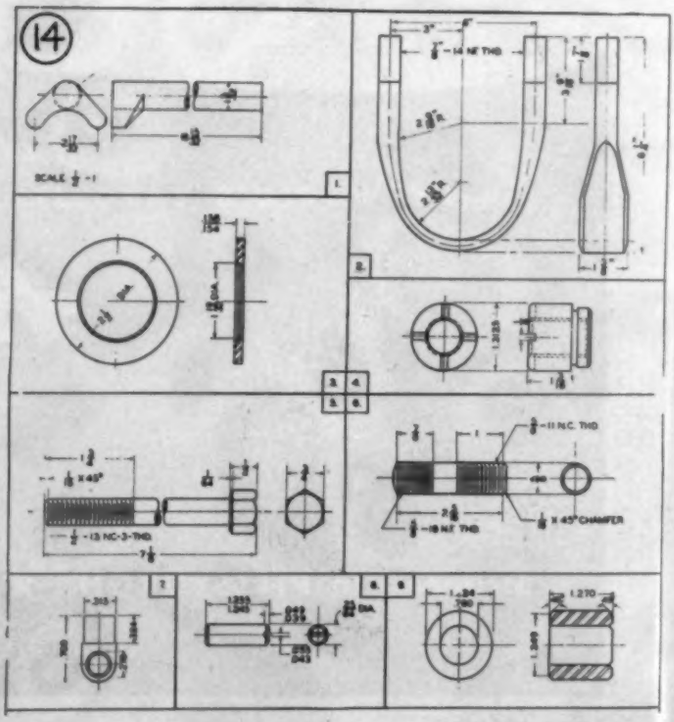


STEEL	CHEMICAL COMPOSITION CARBON	MANGANESE	SILICON	NICKEL	CHROMIUM	MOLYBDENUM	NO. OF HEATS TESTED
A - 2340	.38	.75	.22	3.50			2
A - 3140	.39	.71	.25	1.32	.63		5
A - 4042	.44	.80	.24			.23	5
A - 4140	.41	.71	.28		.98	.23	6
A - 4340	.35	.69	.21	1.74	.64	.23	1
A - 4640	.39	.70	.26	1.73		.24	2
A - 5140	.39	.80	.25		.99		2
NE - 1340	.38	1.73	.22				1
NE - 8339	.42	1.48	.33			.26	1
NE - 8442	.45	1.38	.27			.34	1
NE - 8739	.42	.91	.30	.58	.51	.28	1
NE - 9440	.41	1.02	.47	.39	.29	.13	1
NE - 9640	.39	1.36	.30		.46		1

END QUENCHED IN WATER FROM 1550°F.
HARDNESS LEVEL AT 50 R/C" HARDNESS LEVEL AT 40 R/C"

Fig. 13—Comparison of hardenability of six NE steels and seven standard steels

Fig. 14—Sketch of parts now made from NE steels. See Table IV for details



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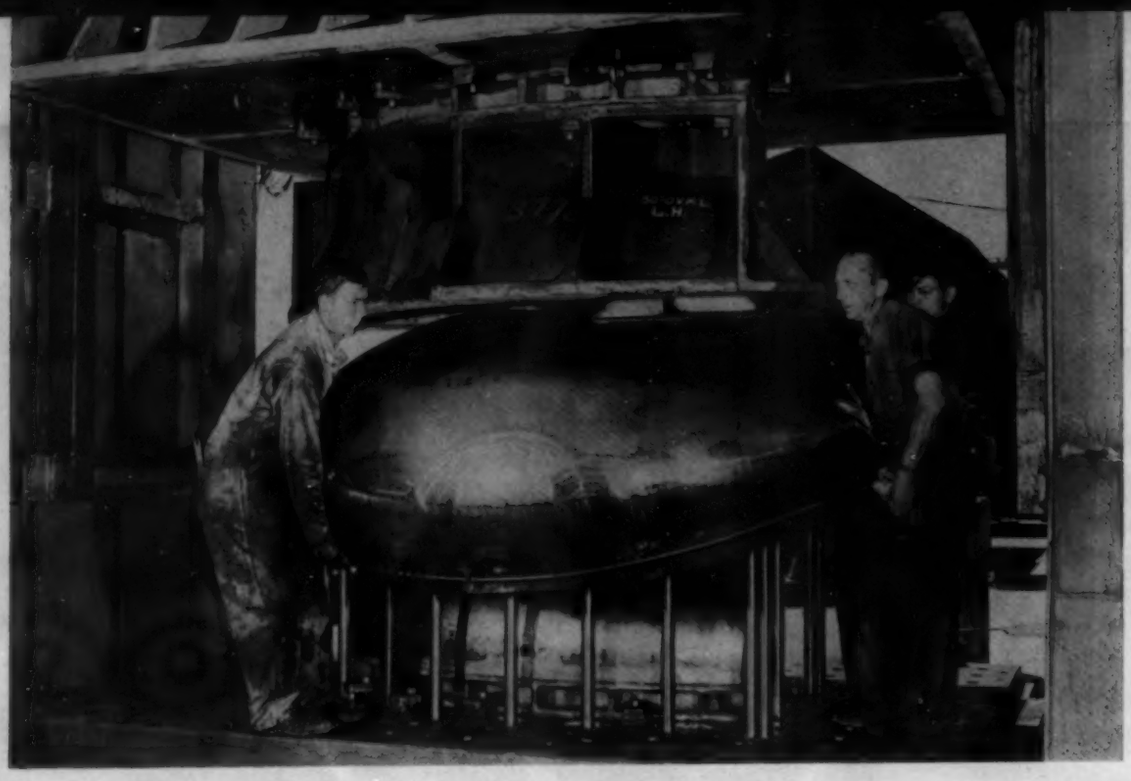

Size of huge machine is indicated from opening shown here. The two punches and dies of Mehanite alone weigh 13 tons. Note depth of draw here

HUGE PRESS DRAWS....

By ANDREW R. BOONE

cowl ventilators

FOR LIBERTY FLEET

TURNING out more than 20,000 large cowl ventilators faster than shipyards on our three coasts use them in building 10,000-ton Liberty ships is a job of no small proportions. The approach employed by Weber Showcase & Fixture Co. Inc., Los Angeles, resulted in use of one of the largest presses ever built which now produces these huge ventilators in two halves.

Use of the new press has reduced to 10 the number of operations required to turn out a ventilator. Of these, five involve welding. The steps follow:

1—Pressing the sheet (14 gage cold rolled deep drawing steel).

2—Trimming the flanges.

For this purpose, company engineers developed a new method of cutting. A jig was built which rolls on a steel table. One-half of the funnel is applied to the jig, pushed onto the table and turned against a 6½-inch high-carbon-steel friction saw revolving at 9000 revolutions per minute. The saw, mounted on a vertical shaft, leaves no grits. The horizontal cut makes a clean trim, the operation requiring only 60 to 90 seconds after the ventilator half reaches the jig.

3—Welding the halves together. Because, as will be explained, it is possible to regulate pressure at several points around the lower platen where cracking or ripping may occur, riveting and hammering are no longer necessary. When the air pressure is applied properly, a smoothly flowing metal draw results.

Riveting hammered sections together is no longer necessary for the huge press draws the ventilators in two sections joined by welding. Halves are tacked first

4—Trimming the bottom and face openings. This is accomplished by returning the ventilator sections to the trimming jig and making two passes against the friction saw.

5—Roll and weld the collars.

6—Weld collars to vent.

7—Weld metal band to sleeve.

8—Weld round frame on edge of oval.

9—Sandblast and galvanize.

10—Install screens, required to collect debris and break force of water when the vessel moves through heavy seas.

Calls for ship cowl ventilators began rolling up like a snowball shortly after Pearl Harbor. Starting with Pacific coast shipyards, the demand spread rapidly until yards on the Gulf coast and along the Atlantic were seeking early delivery of large numbers. Fast production of cowl ventilators was essential. Whereas ventilators then were being made by the "lobsterback" method (many pieces welded and riveted together),

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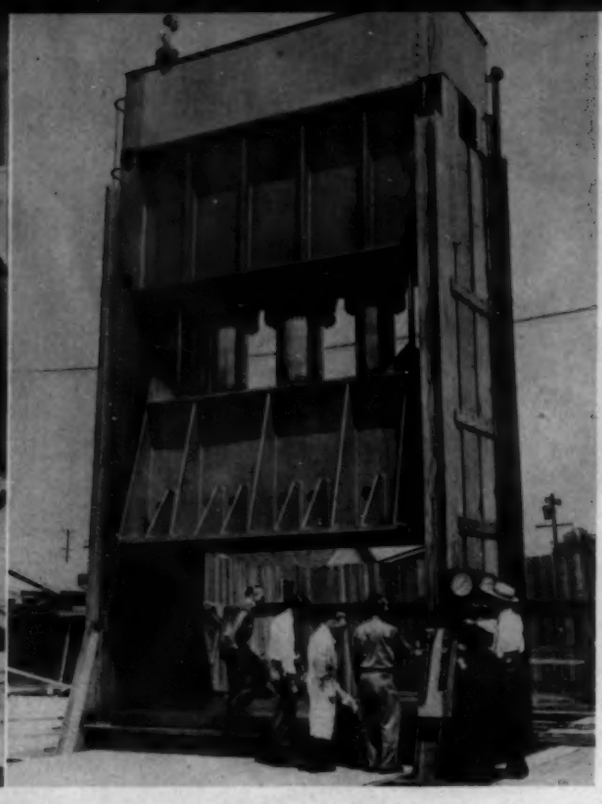
FOR VICTORY
BUY UNITED STATES WAR BONDS AND STAMPS



Left, above—To help increase output of ventilators, Weber engineers devised this new method for trimming the flanges. A high-speed friction saw turning at 9000 revolutions per minute cuts a funnel half in only 60 to 90 seconds. Saw is made of high-carbon steel

Right—Huge press is now engaged in turning out 20,000 large cowl ventilators for the hundreds of 10,000-ton Liberty ships under construction in yards on the three coasts

die stamping seemed the logical solution. Seldom if ever before in the history of shipbuilding had die-stamped ventilators been manufactured. Manufacturers and even the shiprights themselves were doubtful this method could be employed successfully.

This was no easy job for the United States Maritime Commission needed ventilators in eight shapes, measuring from 4 feet 4½ inches to 8 feet 6½ inches in height and 20 to 72 inches in diameter. Plans were sent to the Weber organization, and in a short time its proposals were submitted and accepted.

Not yet was it known exactly how the ventilators would be manufactured on the schedule demanded, however. For a time, smaller ventilators were pressed, welded, riveted and hammered into shape—a combination of steps requiring too many man-hours and resulting in a product whose service life, it was thought, could be materially increased by eliminating rivets.

To make the larger ventilators, an effort was made to punch the halves in two pieces using available presses, followed by welding the two halves together. This procedure proved unsatisfactory. In an effort to find a solution, it was proposed that a larger press be obtained, one of sufficient capacity to handle in a single draw the biggest piece to be undertaken. But no manufacturer could promise delivery within 10 months. Unwilling . . . and unable . . . to wait, Los Angeles was searched for an engineer with facilities for designing, machining and assembling the various sub-assemblies.

Plans finally perfected for the press called for H-column construction and use of structural steel. No forgings could be obtained for the four posts, as well as the other sections of the huge press were fabricated and welded. Hydraulic Press & Mfg. Co. started rolling welding and fabricating cylinders. Emsco Derrick & Equipment Co. fabricated the base, turned the pistons and welded the top member. The L & F Machine Co. fabricated and welded the movable platen and did considerable lathe and planer work. The Los Angeles Shipbuilding & Drydock Corp. undertook the planer work on the movable platen and the base, bored and ground the pull-back cylinders. Western Pipe & Steel Co. rolled the large cylinders from heavy sheet.

Stress analyses were checked and rechecked on every bolt and nut in the job. No chances were taken for this was an important machine. Should it break down, Liberty ships from Seattle to Maine might be delayed in going to sea. Yet 10 weeks after the plans were completed, the huge press turned out its first large ventilator half.

Built at a cost of $50,000 and perhaps the largest drawing (die-stamping) press in the world, this mammoth machine, weighing 250 tons, is capable of squeezing large sheets of metal into difficult and complicated shapes without so much as tearing a corner. It's use has greatly simplified and accelerated production of ventilators. The two punches and dies of hand-ground cast Meehanite iron used to form both halves of the largest ventilators weigh 13 tons.

Unlike former presses of this kind, the new structure embodies H-column construction, structural steel taking the place of the forgings formerly employed as the four corner posts. The press also includes other features not found in older units.

Several factors combine to make this one of the largest drawing presses yet built.

To make possible the deep drawing required for ventilators and other units which may be brought to the press in the future, the designers have allowed for 120 inches of daylight. This adequate space permits workmen to bolt a die of any anticipated size to a movable platen at the top, with the corresponding punch bolted to the lower platen.

In operation, the rams which bring the 21½-ton top platen down have a stroke of 84 inches. At the end of the stroke, the platen presses against a bed measuring 8 x 12 feet, a total bed area of 96 square feet. It is the combination of die space, air cushion arrangement,

(*Please turn to Page* 141)

Hose that conveys cold air under 15 lbs. pressure

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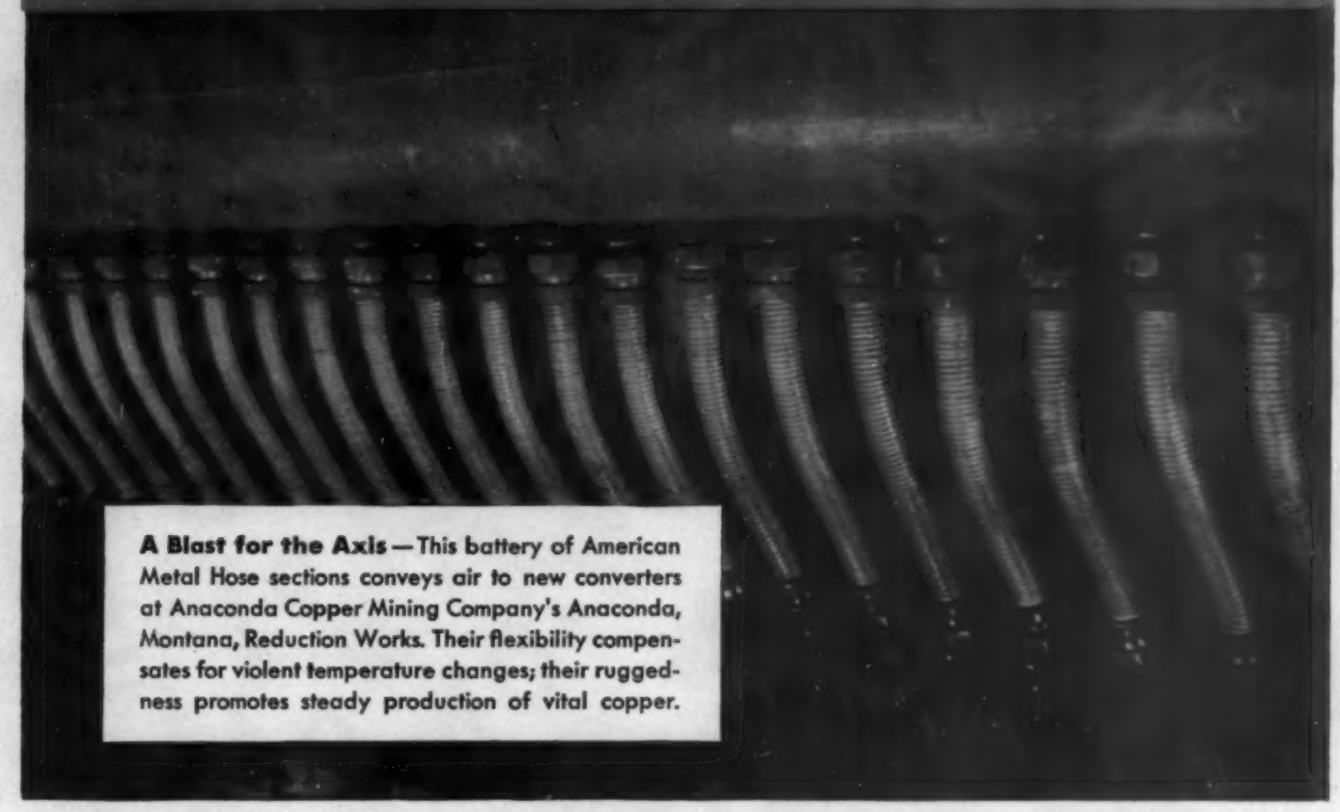
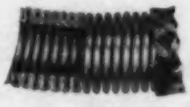


A Blast for the Axis—This battery of American Metal Hose sections conveys air to new converters at Anaconda Copper Mining Company's Anaconda, Montana, Reduction Works. Their flexibility compensates for violent temperature changes; their ruggedness promotes steady production of vital copper.

One of the most attractive features of flexible metal hose and tubing is its seemingly endless range of application. Using virtually any work-



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A train of seven or more heavily loaded dollies moves from warehouse to freight cars for shipment. Boxes contain truck parts. Note wide aisles to accomodate the train which easily goes around corners as shown here

EXPORT BOXING has become one of the most important phases of the wartime activities at Yellow Truck & Coach factories, Pontiac, Mich. No other single phase of this company's entire production program has expanded so greatly as has export boxing.

In normal times, the boxing of chassis and replacement parts for overseas shipment represented but a small percentage of total shipments from the Yellow Truck & Coach plant. For the entire year of 1938, for example, only 3.6 per cent of the total truck shipments were boxed. Contrast this with the month of April, 1942, when 62.5 per cent were shipped boxed.

At the present time, the boxing schedule for one day exceeds the company's entire boxing for the year of 1938. Only 13 working days of the current schedule will surpass the entire boxing accomplishment for the whole year of 1941—a tremendous increase.

In pre-war days, the export production lines at Yellow Truck & Coach functioned only as the demand for their services arose. Naturally this resulted in fluctuations of overseas shipments. The difficulties presented by an operation such as this were many. It was exceedingly difficult to plan ahead, to anticipate adequate floor space requirements or to provide equipment necessary in the varying degrees demanded by such an uncertain type of manufacture. Scheduling and inventories presented additional problems. Of major importance was what to do with the trained manpower that had to be held continually available. Peak demands were of short duration. All requirements, by necessity, were considered temporary. Such projects of course do not warrant expensive equipment outlays.

At the Yellow Truck & Coach boxing plant, truck cabs are packed in separate boxes. Within the cab itself, five wheels and tires are held in a special rack to keep them from touching the instrument panel. Cab seats are later wired in from off the windshield to form a square overall package

As production of military vehicles entered the picture in constantly increasing volume, the export department ran into further complications. There were two major problems to be considered: First, provision must be made for quick and easy reassembling of the boxed chassis because of limited facilities at certain points in the theaters of war. Second, it is necessary to conserve every possible cubic foot of displacement available for shipping purposes. That, of course, means compact boxing is a "must".

Different packing methods are needed to meet various requirements. Governmental inspection and War Department specifications also are factors to be considered. The need for quick delivery of certain units makes constant changeover of boxing setups necessary. Some idea of the internal changes that were taking place is indicated by the fact that

(*Please turn to Page* 142)

NEW LINESTARTER

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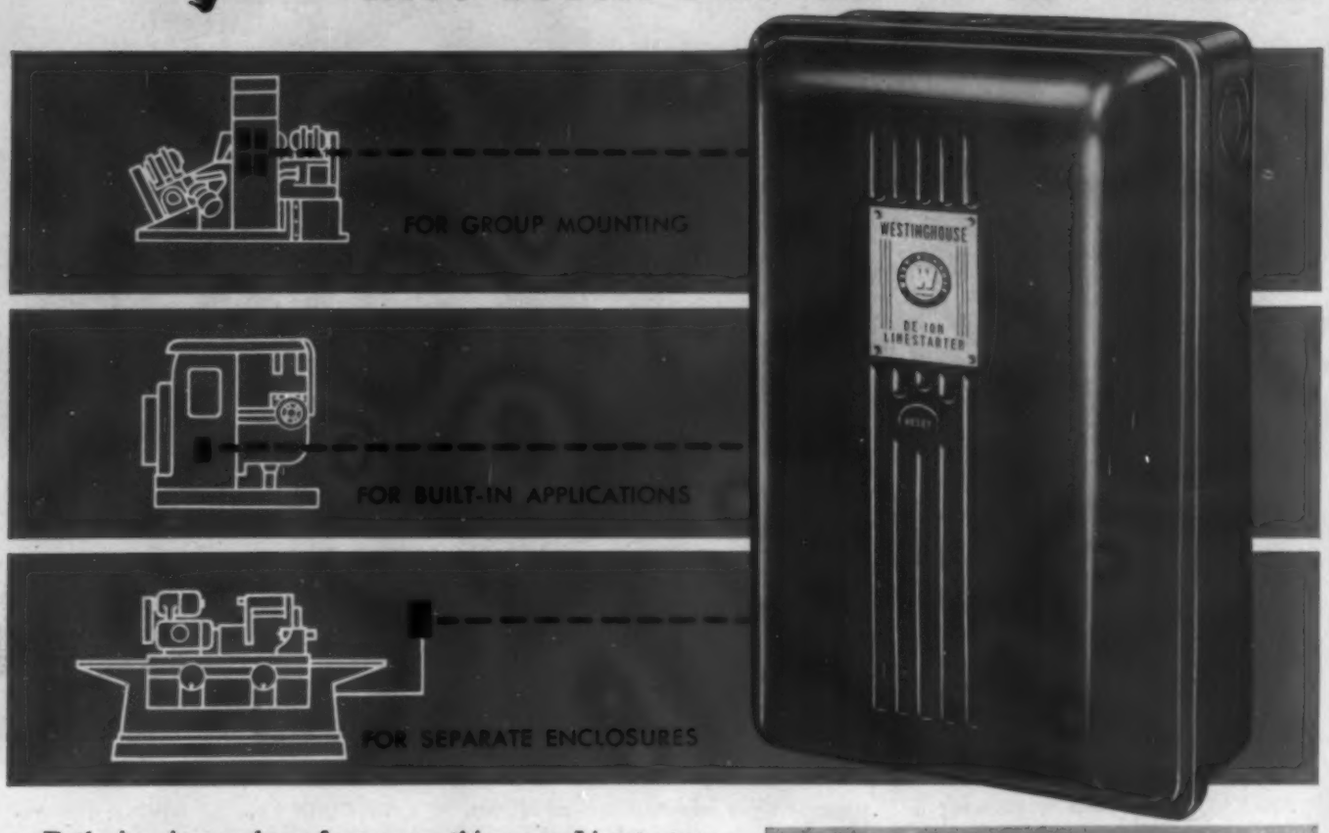
INTO TODAY'S MACHINE TOOL PICTURE



Both in size and performance, this new Linestarter measures up to the requirements of modern machine tool design for compactness, easy mounting and dependable, trouble-free operation.

It is compact—ideal for group mountings and built-in applications. No crowding—all parts are quickly front-accessible.

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Sturdy and efficient, it is designed to give across-the-line starting, stopping, and overload protection under grueling 3-shift schedules. The armature is self-aligning—features a knife-edge bearing of nitrided steel that guarantees positive, accurate contact alignment. Service life of contacts is greatly increased by new, double-break construction.

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Westinghouse MOTORS AND CONTROLS

INDUSTRIAL FANS

THEIR APPLICATION

By MURRAY S. KICE
Chief Engineer
American Blower Corp.
Detroit

AN ENGINEER who is planning a fan system knows the relative importance in attaining final results, between that system for which he determines the speed, cubic feet per minute, by dividing space cubage by a time factor (such as minutes), and those systems where he arrives at the speed, cubic feet per minute, through the establishment of pounds of air per minute. In the first case, an ordinary ventilating system is involved, even though the supply air is tempered by heating coils, or washed with water sprays. An ordinary error in final air delivery does not destroy the utility of the system. This does not, however, detract from the importance of a ventilating system.

When blast heating or air conditioning is involved, a less variation in fan delivery is tolerated because the air moved by the fan is used to produce a definite final temperature or air condition in a space. The importance of any variation in actual fan delivery is proportional to the importance of the system at hand.

But when an industrial process fan system is to be designed, fan speed in cubic feet per minute is arrived at from pounds of air or gas per minute taken directly from the required poundage of product. Hence if the fan in service is deficient in capacity, one's imagination is not taxed to realize eventually that plant earnings, using that fan system, will suffer proportionately. Thus the failure of the fan to attain rating indirectly is reported to the stockholders in the annual corporation statement. That is not a fantastic statement, as anyone that has had fan capacity trouble knows only too well.

Fan deficiency can arise either because the fan is not properly rated, or so installed that it works to a disadvantage, or because the fan has to be shut down for mechanical troubles. No manufacturer, of course, ean produce thousands of machines without a certain percentage of bad fortune. That is, the best of them have trouble at times. The important consideration is the manner in which the trouble is handled. The relevant point, nevertheless, is this: an industrial process fan is a most importance piece of equipment. This is not always realized.

Steel plants use all type sof fan systems such as for general ventilation by wall or duct connection, fume exhaust, office and mill air conditioning, warehouse and shop heating, high-pressure cupola air supply, mill cooling motors, sintering exhaust, power plant forced and induced draft service, circulation of radiant gases, etc. Many want to know why there are so many types of fans and how to use them.

Before the era of research that has so transformed all industry, especially since World War I, straight theory on the one hand and elaborate rule of thumb on the other hand, were the two methods in vogue. Theory is less valuable, today, but it is the premise for research, not field application.

Fanmakers have learned to test out practically every element of design, rating and experience. There are vastly too many variables to use the principles of pure science or mathematics alone for field application.

A careful sequence of practical applications, continued over a period of years, enables fan manufacturers to proceed on a course that seems to produce

Witness test of actual backward blade AHS forced draft fan driven by direct-current cradle dynamometer. View shows other fan development work being done in research department

the most reliable results. And that principle appears to be confirmed by other industries, in their own lines of endeavor. A few practical examples will serve to illustrate this.

During the days of stokers there was a belief that a forward curve fan could not be used for forced draft under boilers and this hangs over in the present day of pulverized fuel. The only present reason for not using this type of fan for this application, is the question of direct-connected motor cost. Wherever the combination of speed in cubic feet per minute and static pressure allows the use of an advantageous electric motor, the forward curve fan makes an ideal forced draft fan for any type of fuel or firing. It is being so used extensively today especially for high pressures where it is quieter, and for 25-cycle jobs where 1800 revolutions per minute is not available, and for engine drive.

For 60-cycle current and average air volumes and pressures, the backward blade fan is used the most for forced draft service because of the lower first cost of the driving motor, rather than because of the old bookish argument of rising static, or non-overloading power curve. Boiler induced draft fans are another case. The old argument was for a radial blade fan, and there is nothing wrong with it except this fan requires much more space, is expensive, and operates at too low a speed for reasonable first cost of driving motor.

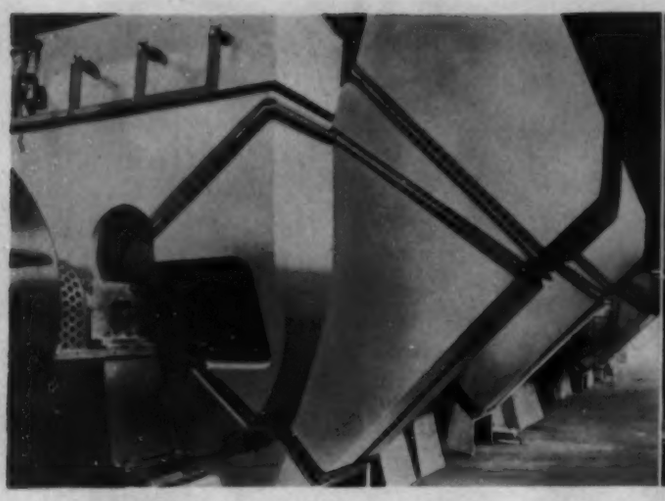
The radial tip fan is a compromise between the radial blade and the backward blade fans, so far as characteristics are concerned. It has a flatter power curve and operates at relatively high rotating speed. But it is not efficient, and requires nearly the high wheel tip speed as does the backward blade fan, though it has a stronger blade position than the backward blade fan.

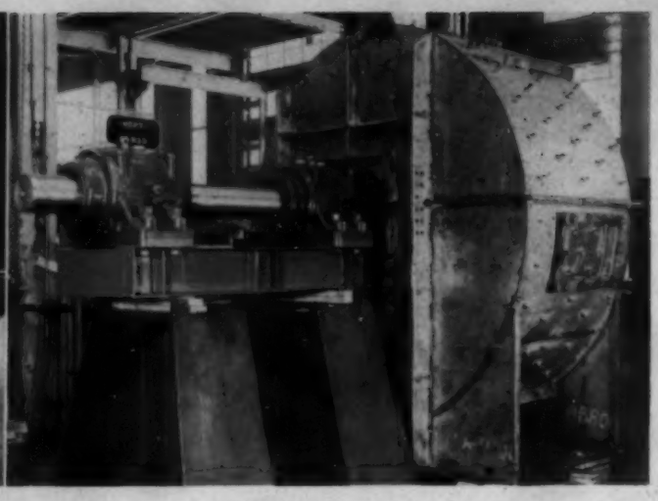
The forward curve fan for induced draft service has many advantages. It is efficient, requires less space, operates at the lowest wheel tip speed of any fan and is only moderately expensive.

A battery of six forward curve fans serving three steel plant boilers is shown in one of the accompanying illustrations. Each pair of fans is in parallel at maximum efficiency for peak boiler load. For normal load, one fan is used. Of each pair, one is driven by a constant-speed motor, the other by a variable-speed steam turbine. Single electric or steam driven fan is used for heat or power balance.

When a pair of forward curve fans are used in parallel for one boiler, one fan alone will carry the boiler to all but peak loads. It has made some remarkable records in producing pressures in service as high as 20 inches water gage at 550 degrees Fahr., where a combination of blast furnace gas and pulverized fuel has been used to fire the boilers. This fan also has been phenomenal in resisting the scouring action of such gritty gases.

Theories still are being offered to prove the forward curve fan will not work in parallel when selected to take





Left, above—Field installation of six Sirocco forward curve induced draft fans serving three steel plant boilers. Units operate with automatic control

Right—Shop assembly of Sirocco forward curve fan for circulating radiant gases Bearing bed plate in field is mounted on concrete pier

advantage of its full high efficiency, that it cannot be closely motored, and that it is short lived. But these are examples where modern application practice discards classic theory as such, and proceeds on the basis of practice established by research development and confirmed by field success. It is interesting to note that in the last decade no user of a forward curve induced draft fan has failed to continue its use on new or rebuilt boilers for any service experience reasons.

The sintering fan is an interesting example of an industrial process fan. Gas temperature is usually around 350 degrees Fahr. Suction varies from a few cases at 10 inches to a few cases as high as 30 inches water gage. The average is around 20 inches. Volumes usually average around 90,000 cubic feet per minute. The gases contain abrasive and adhesive dust.

In practically all cases the radial blade fan is used. If a forward curve fan were used, and the dust filled the curved blade, about 25 per cent reduction in air capacity would result. In fact, there has been the tendency to eliminate all curved blading of any style for sintering fans. Cleaning devices could be employed but to date none has attempted this. Likewise, dust collectors generally are not used. But since World War I, the fan manufacturer has made many sintering fans, previously made by others not in the fan business. An interesting result has taken place. When such a previous sintering fan has been removed, and a new fan installed by those who know fan design, more sinter is produced. In one case where the original motor and driving speed were used to operate the correctly made paddle wheel fan, it was reported 30 per cent more sinter was produced.

Likewise the output of a rolling mill can be limited, for one thing, by the capacity of its driving motor. This in turn depends upon the motor ambient temperature and the overload the motor is taking. If it is kept cool, it can put out increased power, useful for increasing mill capacity and again, an increase in earnings . Fans are used for this purpose. They of course are important as it take a definite poundage of air to remove the required B.t.u.'s per minute from the motor frame, to accomplish the foregoing results.

Backward Blade Fan Efficient

Generally, the backward blade fan is used for this service. It is efficient and generally hits a good motor speed. But the important ultimate consideration is that unless its builder knows his fan design, it is likely not to deliver its rated poundage of air. Since this excludes reference to any of the reliable fanmakers, it sounds somewhat immature, but, not all fans purchased for this service are made by top flight fan manufacturers. Fan engineering is easy to get, but it takes infinite care to obtain the right kind.

A challenging application for fans arises in the case of circulating gases in slab annealing furnaces. These gases are radiant as the temperature ranges from 800 to 1350 degrees Fahr. Stainless steel is required to resist scaling, internal corrosion, and stretching, or creep, of these bright red rotating parts. Ordinarily these alloys are expensive; at the present time they are critical materials and should be used sparingly. The forward curve fan fits into this picture naturally, as it requires less materials and less alloying. Low-tip speed provides low stress. These fans have been entirely successful.

The summary of fan application for steel plants is to use reliable fan equipment, to use horse sense in application, to give the fan a break by careful duct design, and to allow a reliable fan manufacturer sufficient latitude so that he can select the type of fan he recommends for a given service or specification.

(Concluded Next Week)

166,000,000 Pounds of Brass Saved by New Booster

For a design that saves 166,000,000 pounds of brass on the present procurement of M-20 A 1 booster bodies, used in the firing mechanisms of 75 and 105 millimeter shell, Charles H. Godschall, manager of the Metal Division of Philco Corp. and Lieutant Colonel D. L. Woodberry, Army Ordnance, recently were officially cited by the Ordnance Department of the United States Army for making "a marked contribution to the vital war production program to conserve critical material and machines."

Savings of critical materials in the production of booster bodies resulting from the new Philco design is equivalent of a column of brass 24 feet square as high as the Washington monument, it is reported.

To effect the savings, the threaded tube, 2¼ inches in diameter and 1¾ inches long, was redesigned so that it could be made in two parts, the outer shell being a steel stamping and the insert produced from steel bar stock. With older methods the entire part was machined from brass bar stock or forging.

Work is now under way on a design to permit use of malleable iron castings as an alternate material.

A SMALL FURNACE WITH BIG QUESTIONS

- ★ What type of refractory should be used?
- ★ What effect will slag have upon the refractory lining?
- ★ How can the refractory be protected against erosion?
- ★ How can the load-carrying ability of the floor brick be judged?
- ★ What will be the heat losses due to periodic operation?
- ★ What is the best type of arch or roof support for this furnace?
- ★ What precautions should be taken against the effects of expansion and contraction?
- ★ Will heat losses through the structural steel be great? How can they be minimized?
- ★ Should the brick be laid with a heat-setting or an air-setting mortar?
- ★ What type of wall anchoring, if any, is most suitable?
- ★ What protection, if any, should be provided against flame impingement?

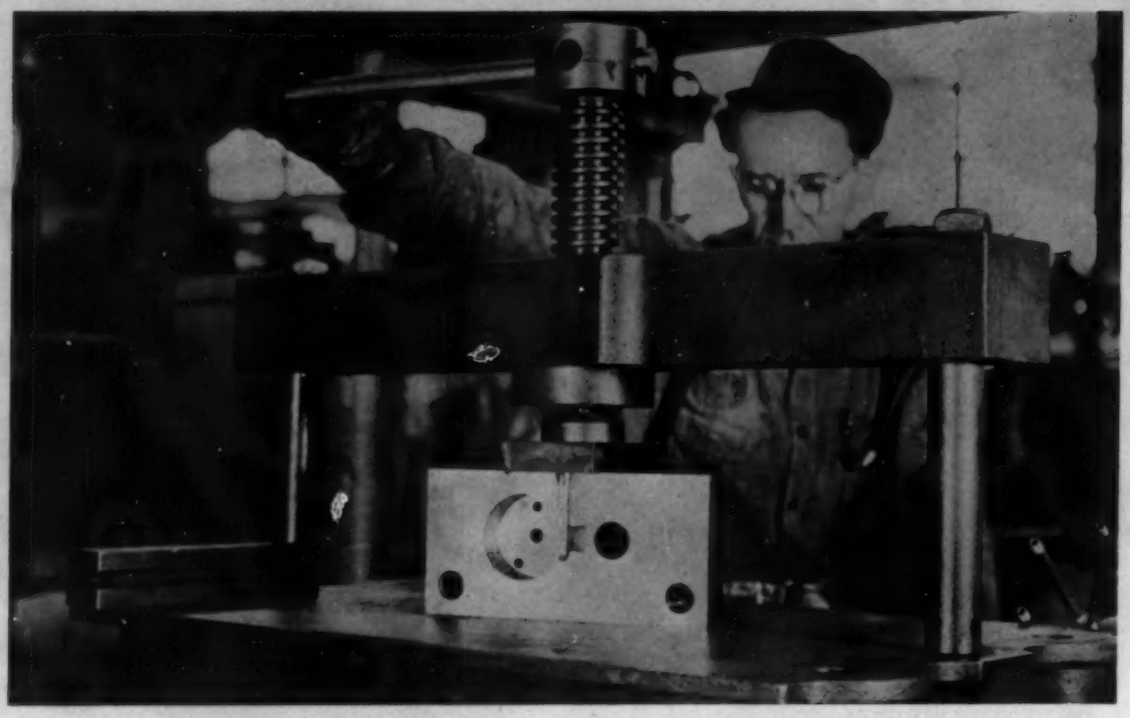
B&W Refractories Engineers Answer Questions Like These Every Day.

THE BABCOCK & WILCOX COMPANY
Refractories Division
85 Liberty Street New York, N. Y.

B&W Refractories Engineers are qualified to give advice on furnaces like the one illustrated, or on stress-relieving units that employ as many as 80,000 B&W Insulating Firebrick. Their advice is free and without obligation.

B-157

BABCOCK & WILCOX



This oil-hardening die has been removed from the quench while at 450 degrees Fahr. It can be straightened at that temperature with no appreciable loss in hardness. Die is allowed to cool to 300 degrees under press, then is transformed to the draw

straightening

Heat-Treated Parts

This is Section I in a series of four articles on methods of controlling and correcting the distortion that occurs in heat treating certain types of parts. Section I is devoted to oil-hardening steels.

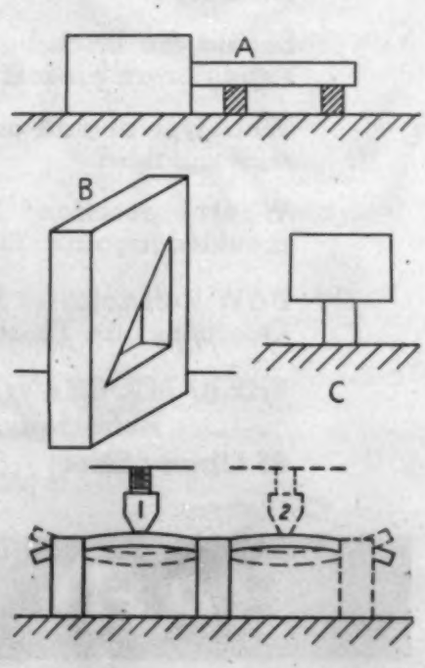
By G. B. BERLIEN
Chief Metallurgist
Lindberg Steel Treating Co.
Chicago

ONE OF the major problems of heat is to maintain the original shape or straightness of tools and machine parts. Several factors enter into the problem of distortion. Not the least is proper manipulation of heating rates and proper support while in the furnace. However, with a piece of steel at heat, the job is only half done, and at this point we must begin to control cooling and cooling stresses.

Difference of cross section will often result in a relatively thin section pulling a larger section with it while cooling. We can apply external pressure, if conditions warrant, to various vital parts remembering to mix in large doses of horse sense. A practical knowledge of hardening is a valuable asset in attempting to control the shape of a tool or machine part either while cooling or after normal temperatures have been reached.

The amount of pressure to be applied in straightening is influenced mainly by type of steel, cross section and temperature at time pressure is applied. There is no cut and dried rule that we can follow. This "amount" is something which must be acquired through experience, and oftentimes with a heart breaking "ping" which heat treaters soon learn to recognize as a sign that excessive pressure has been applied. In some types of work it is known as the "feel of the press". Such tools as fixtures and presses have peculiarities and eccentricities common to themselves, much as the automobiles which we drive, and it is

(*Please turn to Page* 137)



Upper view—Work must be supported properly while in the furnace if distortion from drooping is to be prevented. Blocks at a *help prevent distortion in shaft; long flat pieces generally warp less when stood on edge as at* b, *except of course where the piece is too thin to support itself edgewise; work of the shape shown at* c *heats more uniformly and with less distortion if it is placed with small end down*

Lower view—It is good practice to take "kinks" out first, then straighten the long distortions. "Pressing by" is generally necessary. Distortion is greatly exaggerated here for purpose of illustrating action

The Man at the Lathe Fights Too!

... and every turn of the spindle, as he guides his work through many precision operations, helps bring Victory one step closer.

Hours spent at a lathe may lack the dangerous excitement of combat—but the valorous men on the battle fronts breathe a prayer of thankfulness for guns, shells, planes, tanks—for all the superb equipment which is helping them swing the tide against the Axis.

So the man at the lathe is a soldier, too, as he bends his shoulders to the task of pouring out weapons in an ever-increasing stream. He faces his task grimly... proudly... proclaiming by the gleam in his eye and the jut of his jaw that he will not be outdone in service to his country, and knowing that America's production is a decisive factor in the war.

To help America "tool up for Victory," the output of South Bend Lathes has been increased (we can't say how much) in the last year and a half—giving the man at the lathe the efficient, dependable production weapon he must have to win.

There is a South Bend Lathe for every class of work—engine lathes, toolroom lathes, and turret lathes. Write now for our new catalog No. 100B in which the entire line is illustrated and described.

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 36 YEARS

SOUTH BEND, INDIANA

Photo courtesy of Popular Photography

HOW MUCH MATERIAL CAN YOU *Save?*

Save Manpower, too

The U. S. loses as many as 460 million man-days yearly through accidents. That's enough time to supply an army of 200,000 with full fighting equipment.

Remind your employees to play it safe *all the time*—on the job or away from it. Casualties on the home front are just as damaging as on the fighting fronts. For more data, write National Safety Council's *War Production Fund to Conserve Manpower,* William A. Irvin, National Chairman, Chrysler Bldg., New York City.

THE problem is simple to state. The nation's supply of essential materials must be made to go farther —particularly the vital alloy steels. More must be done with less.

Nosing out the scrap—the idle or dormant metal—is highly necessary, but it's only half the answer. The other half lies in using *new* alloy steels more efficiently—checking machine set-ups and plant procedures to reduce rejects, spoilage and undue scrap—using lower alloys wherever possible—plugging every loophole of waste.

Scrap the old steel, conserve the new; that's the only way the nation can secure a greater yield of war equipment for every ton of alloy materials taken off the national stockpiles. Let us help you *save!*

ADDRESS DEPT. S-2

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

A-8828 . . . W & D

Alloy Addition Agents

(*Continued from Page* 95)

at higher tempering temperatures. A rigid line of demarcation, based on either hardness or tempering temperature, was practically impossible because of the great differences observed in different steels and different sections in the quenched and tempered condition as well as differences in the rate of decrease of hardness with increase in tempering temperature.

TABLE I—Alloys for Use as Addition Agents

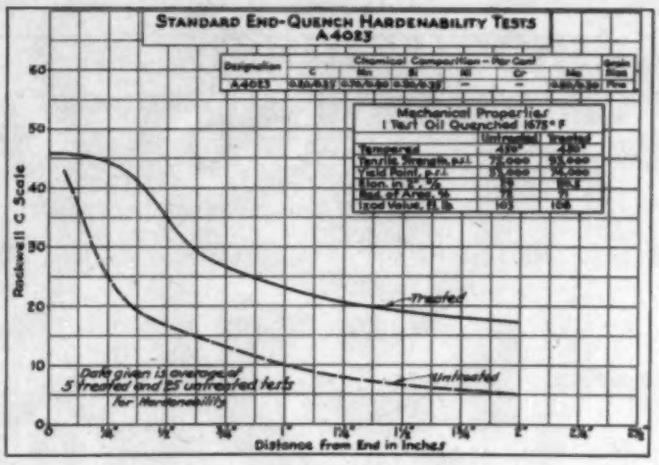
Alloy Designation	Aluminum	Boron	Calcium	Manganese	Silicon	Titanium	Zirconium	Iron
1	7.0	0.5	10.0	.....	35.0/40.0	10.0	4.0	bal.
2	...	10.0/12.0	..	...	3.0	...	...	bal.
3	10.0/20.0	1.0/2.0	..	15.0/25.0	20.0/30.0	10.0/20.0	.	bal.
4	13.0	0.5	...	8.0	.....	20.0	4.0	bal.

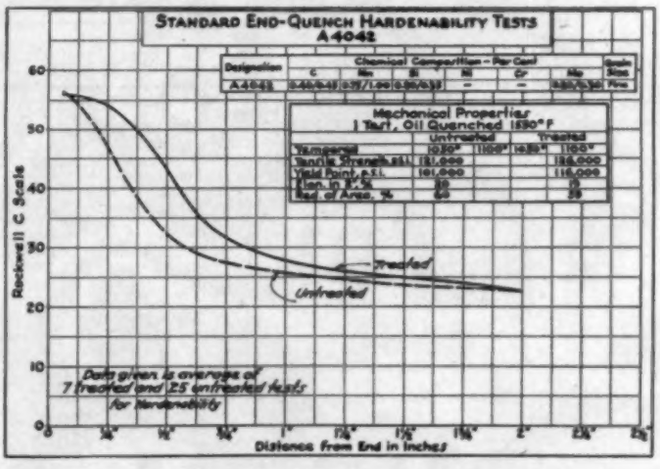
The improvement of ductility was greater when a low tempering temperature was used to produce high hardness values.

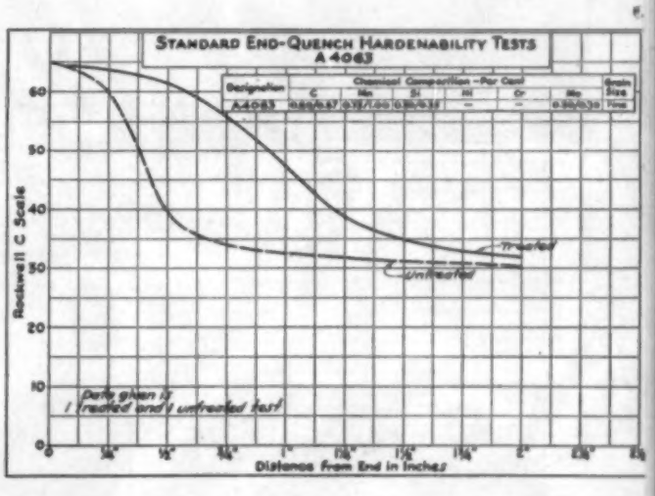
Notched-bar sensitivity was improved by the addition of the special alloys to steels which may be used at high hardness values in the as-quenched condition or after low-temperature tempering.

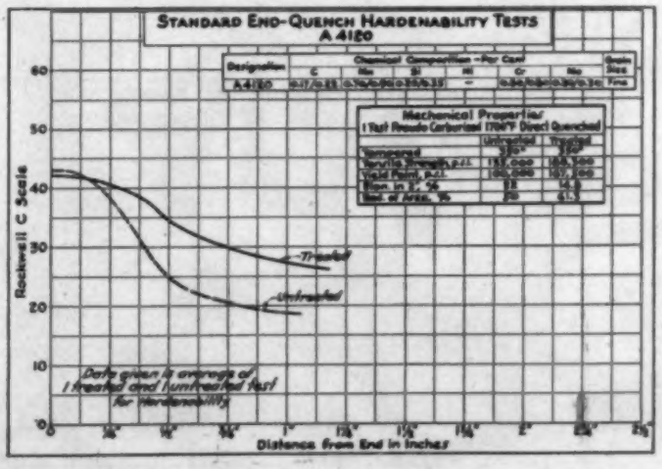
The data studied show that the physical properties of steels treated with special alloy addition agents were not materially improved when the steel was normalized as a final thermal treatment.

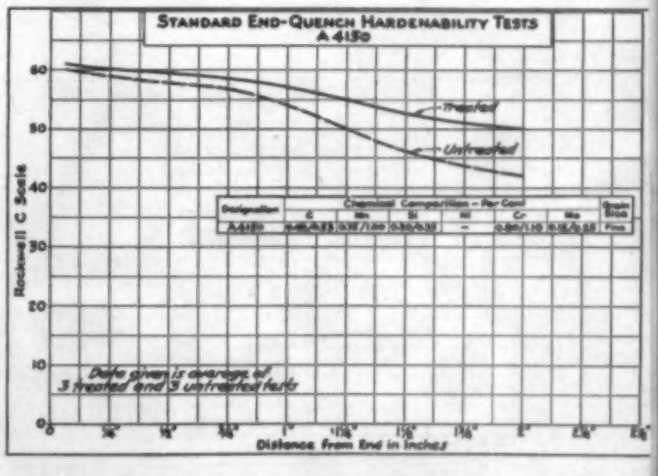
It was indicated clearly that the special alloy addition agents were very effective in enhancing mechanical properties, the degree depending upon the base composition of the steel under study. For example, in steels of low-hardening capacity which will not harden throughout in the sections involved, a substantial increase in tensile strength may be obtained. For steels of high-hardening capacity the results obtained were not proportionate. The reason is,







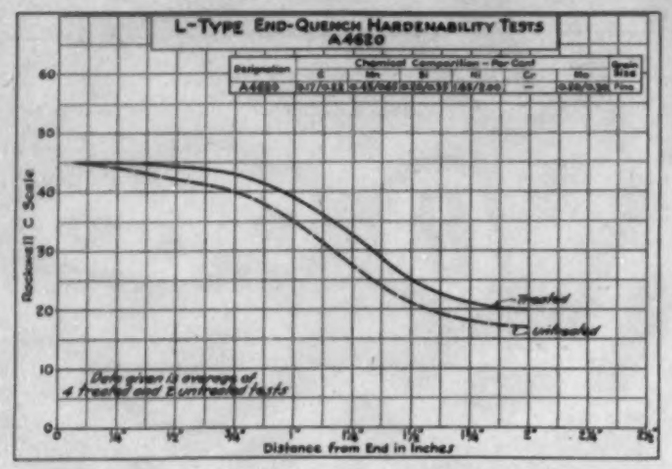




SPECIAL ALLOY ADDITION AGENTS

L-Type End-Quench Hardenability Tests A4620

Designation	Chemical Composition – Per Cent						Grain Size
	C	Mn	Si	Ni	Cr	Mo	
A4620	0.17/0.23	0.45/0.65	0.20/0.35	1.65/2.00	–	0.20/0.30	Fine

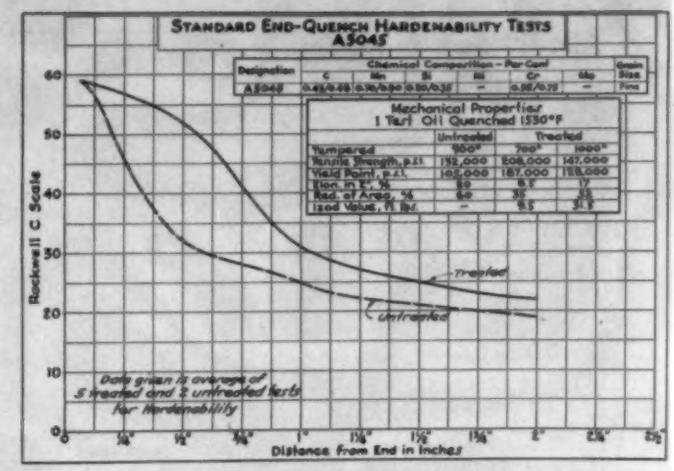


Standard End-Quench Hardenability Tests A5045

Designation	Chemical Composition – Per Cent						Grain Size
	C	Mn	Si	Ni	Cr	Mo	
A5045	0.43/0.48	0.70/0.90	0.20/0.35	–	0.88/0.70	–	Fine

Mechanical Properties
1 Test Oil Quenched 1530°F

	Untreated	Treated		
Tempered	950°	700°	1000°	
Tensile Strength, p.s.i.	192,000	208,000	147,000	
Yield Point, p.s.i.	105,000	187,000	118,000	
Elon. in 2"- %	20	8.5	17	
Red. of Area, %	60	35	63	
Izod Value, ft. lbs.	–	8.5	31.5	

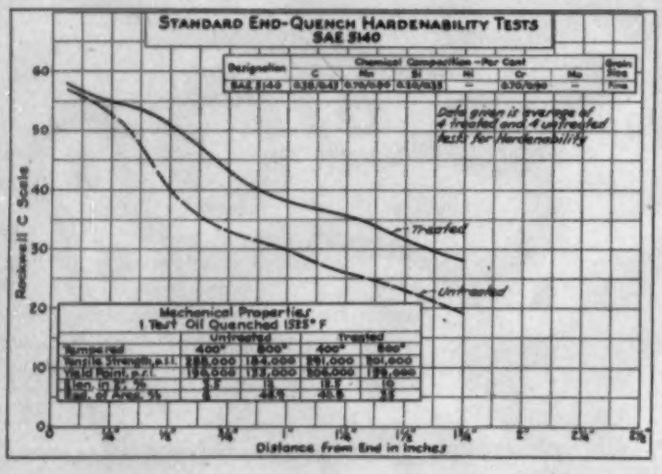

Rockwell C Scale
Distance from End in Inches
Treated
Untreated
Data given is average of 5 treated and 2 untreated tests for Hardenability

Standard End-Quench Hardenability Tests SAE 5140

Designation	Chemical Composition – Per Cent						Grain Size
	C	Mn	Si	Ni	Cr	Mo	
SAE 5140	0.38/0.43	0.70/0.90	0.20/0.35	–	0.70/0.90	–	Fine

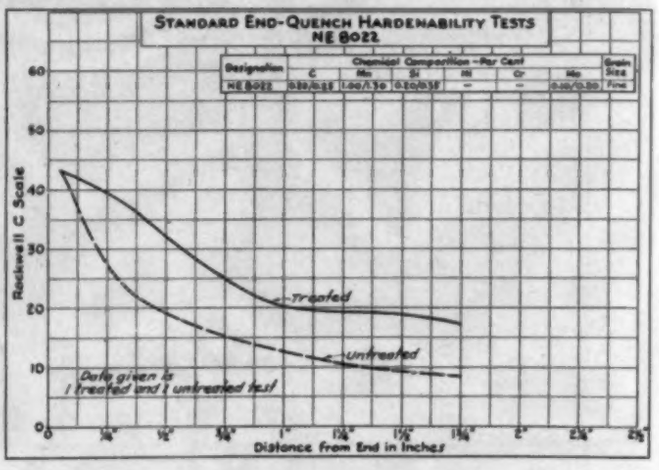
Mechanical Properties
1 Test Oil Quenched 1525° F

	Untreated		Treated	
Tempered	400°	800°	400°	800°
Tensile Strength, p.s.i.	288,000	184,000	291,000	191,000
Yield Point, p.s.i.	193,000	173,000	254,000	134,000
Elon. in 2"- %	11	18	10.5	19
Red. of Area, %	36	66.5	40.5	65


Rockwell C Scale
Distance from End in Inches
Treated
Untreated
Data given is average of 4 treated and 4 untreated tests for Hardenability

Standard End-Quench Hardenability Tests NE 8022

Designation	Chemical Composition – Per Cent						Grain Size
	C	Mn	Si	Ni	Cr	Mo	
NE 8022	0.20/0.25	1.00/1.30	0.20/0.35	–	–	0.10/0.20	Fine

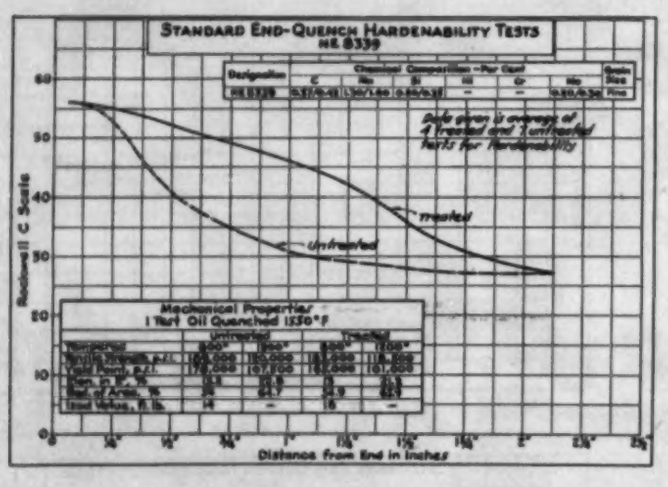


Standard End-Quench Hardenability Tests NE 8339

Designation	Chemical Composition – Per Cent						Grain Size
	C	Mn	Si	Ni	Cr	Mo	
NE 8339	0.37/0.41	1.30/1.60	0.20/0.35	–	–	0.20/0.30	Fine

Mechanical Properties
1 Test Oil Quenched 1550°F

	Untreated		Treated	
Tempered	400°	1200°	400°	1200°
Tensile Strength, p.s.i.	184,000	135,000	184,000	118,000
Yield Point, p.s.i.	179,000	107,000	182,000	101,000
Elon. in 2"- %	11	22.5	11	24.5
Red. of Area, %	36	64.9	36.9	64.9
Izod Value, ft. lb.	14	–	15	–

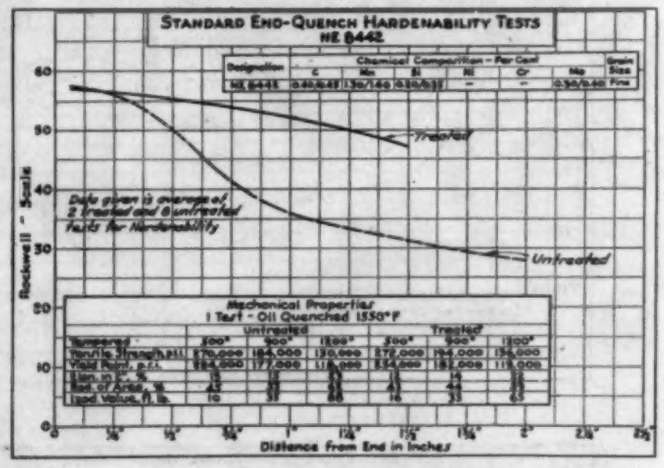

Rockwell C Scale
Distance from End in Inches
Treated
Untreated
Data given is average of 4 treated and 4 untreated tests for Hardenability

Standard End-Quench Hardenability Tests NE 8442

Designation	Chemical Composition – Per Cent						Grain Size
	C	Mn	Si	Ni	Cr	Mo	
NE 8442	0.40/0.45	1.30/1.60	0.20/0.35	–	–	0.35/0.45	Fine

Mechanical Properties
1 Test - Oil Quenched 1550°F

	Untreated			Treated		
Tempered	500°	900°	1200°	500°	900°	1200°
Tensile Strength, p.s.i.	270,000	184,000	130,000	272,000	184,000	134,000
Yield Point, p.s.i.	254,000	177,000	118,000	254,000	182,000	115,000
Elon. in 2"- %	11	17	23	11	15	25
Red. of Area, %	43	58	64	43	54	66
Izod Value, ft. lb.	10	31	66	16	33	63

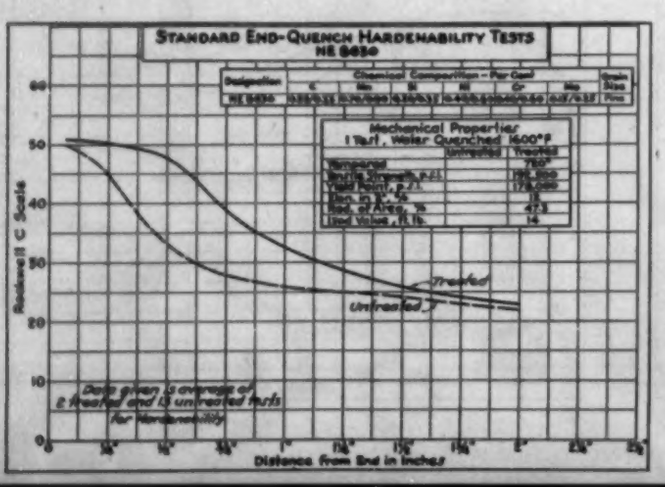

Rockwell C Scale
Distance from End in Inches
Treated
Untreated
Data given is average of 2 treated and 2 untreated tests for Hardenability

Standard End-Quench Hardenability Tests NE 8630

Designation	Chemical Composition – Per Cent						Grain Size
	C	Mn	Si	Ni	Cr	Mo	
NE 8630	0.28/0.33	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.15/0.25	Fine

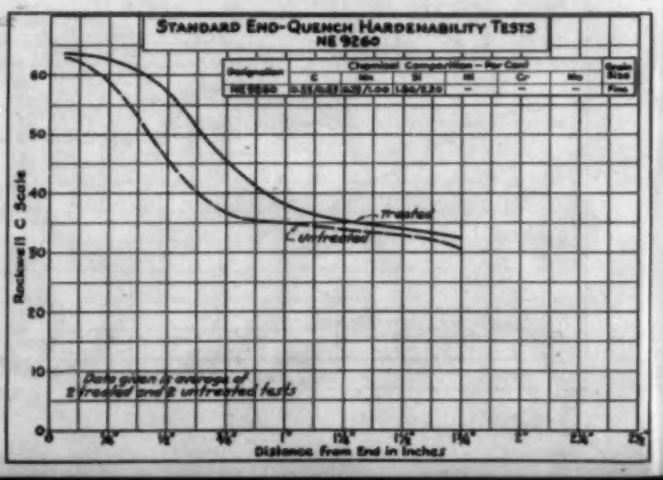
Mechanical Properties
1 Test, Water Quenched 1600°F

	Untreated	Treated
Tempered		1150°
Tensile Strength, p.s.i.		196,000
Yield Point, p.s.i.		174,000
Elon. in 2"- %		15
Red. of Area, %		47.5
Izod Value, ft. lb.		14


Rockwell C Scale
Distance from End in Inches
Treated
Untreated
Data given is average of 2 treated and 2 untreated tests for Hardenability

Standard End-Quench Hardenability Tests NE 9260

Designation	Chemical Composition – Per Cent						Grain Size
	C	Mn	Si	Ni	Cr	Mo	
NE 9260	0.55/0.65	0.70/1.00	1.80/2.20	–	–	–	Fine



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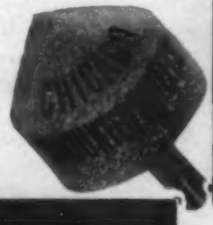
Can make prompt deliveries on all Mounted Points and Grinding Wheels 3″ in diameter and under. We've stopped making the larger sizes for the duration, so we can fill orders quickly for these important smaller sizes.

TRY ONE FREE—Tell us the kind of job, type grinder you use and size wheel you'd like for your test, and we'll send one free postpaid.



CHICAGO WHEEL & MFG. CO.

America's Headquarters for Mounted Wheels

1101 W. Monroe St. Dept. ST Chicago, Ill.

IT'S OUR WAR-TIME JOB

With the approval and endorsement of W P B, all our facilities are concentrated on turning out large quantities of wheels 3″ in diameter and under. We're at it 24 hours a day, and keeping up with orders. Our central location is an advantage and means no time is lost between our production line and yours.

NEW CATALOG—shows mounted wheels in actual colors and sizes, portable electric tools and time-saving accessories for grinding, burring and polishing.

MAIL THIS COUPON TODAY

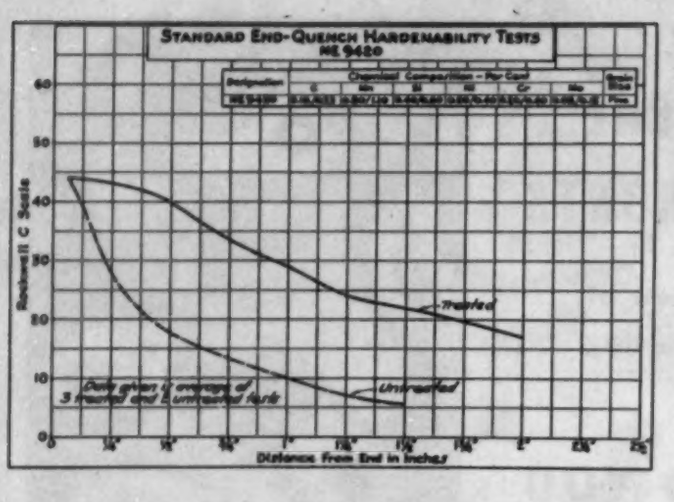
ST-3

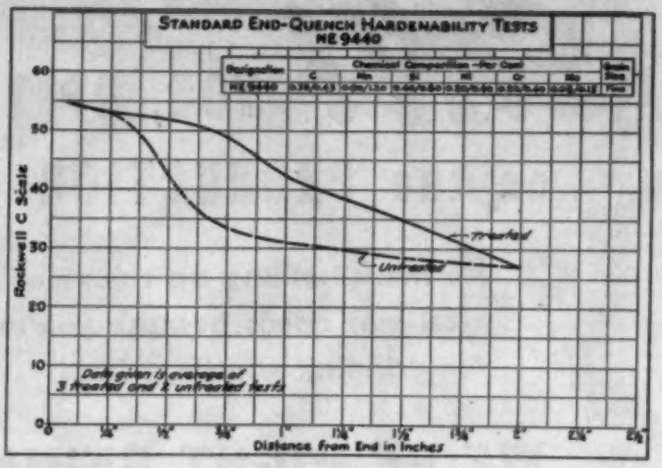
☐ Send Catalog.

☐ Free Wheel. Size. .....

Name .....

Address .....





of course, that steels of high hardenability contain enough alloy to secure the maximum which can be obtained in the section involved. All the mechanical property data presented here are for either 1-inch rounds or preliminary machined test specimens.

General: There were some instances where additions to the mold were more effective than the same additions to the ladle. This was not general but, in view of the likelihood of difficulty in control, it is recommended that mold additions be reserved for experimental work and that, in production, addition of these alloys be made while the steel is in the ladle.

Below certain recommended limits for each addition agent, maximum results were not obtained. Above recommended limits, undesirable effects may result.

In making use of special alloying additions it must be recognized that at the present time there is no generally satisfactory rapid commercial method of analyzing the finished steel for their presence. For that reason, their use in producing steels to meet chemical specifications only is not recommended. These alloys can be used, however, in producing steels to meet mechanical property requirements, or special performance tests.

In reporting mechanical property data on steels manufactured with special alloying additions, it is recommended that such steels be clearly designated.

A general summary of the study is as follows:

—The use of special alloy addition agents will increase, with varying effect, the hardenability of all grades of steel studied, the degree being dependent on the base composition.

—The most beneficial effect of the use of these agents on mechanical properties, especially ductility, is in steels heat treated to high hardness levels.

—To obtain the maximum results for any property, the steels to which these agents have been added must be quenched and tempered.

—The base composition and section as well as the ultimate hardness, strength or depth of hardening are the major factors to be considered in determining those instances in which these agents can be used to maximum advantage.

—The use of these agents will permit reduction in the amount of strategic alloying elements previously used to give the desired tensile and impact properties.

NEW PROCESS PRODUCES GEARS WITHOUT MACHINING

DETAILS of a revolutionary new manufacturing method—production of steel gears without machining—are to be revealed in Milwaukee, March 25 to 27, at the national war production meeting of the American Society of Tool Engineers.

The process, developed by tool engineers of Timken Detroit Axle Co., Detroit, already is being applied to the production of pinion gears for military vehicles, it is reported.

With it, gears complete with gear teeth are precision forged or "coined" on presses. The process is said to be so accurate that gears produced—even after heat treating—are held within limits of a thousandth of an inch.

Standard practice up to now consisted of forging "blanks" of steel, into which the teeth were cut by a milling or generating process—frequently required a roughing and a finishing operation. The specialized equipment

(*Please turn to Page* 144)

★

IT'S ALL THE SAME TO THE DoAll

SPECIAL PARTS OR 24 HOUR PRODUCTION

A battery of DoAlls in the production line of a large aircraft plant

● The DoAll is doing its bit—and a very big bit—wherever metals, alloys or plymetals are cut and shaped.

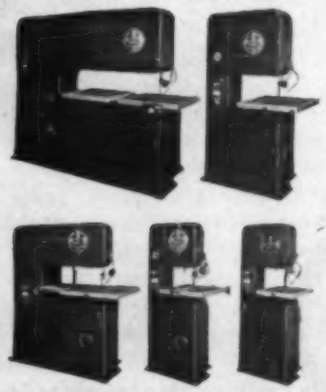
Steady streams of parts for guns, jeeps, planes, trucks, tanks, flow over its work table. Anything from a 2000-lb. gun slide to a 2-oz. instrument part—15-ft. channel forms, blocks a foot square, all kinds of molds, dies and liners, form tools, gauges, machine parts.

DoAll follows a straight line with precision accuracy—follows any contour design and gives a smooth finish requiring no further machining—does internal and external sawing, filing, polishing.

Making special dies is easy and quick on the DoAll

DoAll cuts sector gears in 5 min. each. Former method 30 min.

THE BIG FIVE



DoAll Contour Machines for rapid internal and external sawing and filing of any metal or alloy. Priced from $1,000 to $5,000, each model with motor.

FASTEST METAL CUTTING METHOD

Because of its speedy, accurate performance, a great deal of shaper, milling and lathe work is switched to the DoAll. Time schedules are whittled down to astonishing new lows. A day's work in an hour—an hour's work in ten minutes—these are typical DoAll results.

LET US SHOW YOU

A factory trained man will call with a DoAll and demonstrate many amazing metal-sawing short cuts on your own work.

WRITE FOR THIS BOOK

"DoAlls on Production", a picture story of performance in many different plants. Interesting and informative.

CONTINENTAL MACHINES, INC.

1324 S. Washington Ave., Minneapolis, Minn.

Local DoAll offices (See Telephone Directory) distribute these machines. They also sell and service DoAll Grinders, Gage Blocks, Band Saws and Files, Parts and Accessories.

DoALL GRINDER

Finest made for high precision surface grinding. Adaptable to wet or dry grinding.

DoALL GAGE BLOCKS

81 to each set. Come in 3 accuracies:
WORKING SET, 8 millionths of an inch $295.00
INSPECTION SET, 4 millionths of an inch $350.00
LABORATORY SET, 2 millionths of an inch. Price on application.

Purchasing Manual

FOR AIRCRAFT TUBING

THE AIRCRAFT Tubing Purchasing Manual included here was prepared by Aircraft Scheduling Unit, Aircraft Production Division, War Production Board, in an effort to facilitate the placing of orders and to help eliminate delay due to lack of sufficient information.

This data should be made a part of every steel tubing order. If all the information shown is strictly complied with, a more efficient procedure of entering orders on the mill will result. The manual gives a complete synopsis of all the various specifications required for steel tubing with a detailed explanation under each specification.

Some delay in shipment of tubing has resulted from improper information submitted on purchase orders. If the information in the tubing manual is followed very closely by the purchasing department of the various user companies, it will be of tremendous value to the tube mills involved.

Text of the manual follows:

COMPLETE DETAILS REQUIRED:

—Size must be indicated by only two dimensions (outside diameter or inside diameter and wall, or outside diameter and inside diameter).

– Grade (steel analysis and temper).

—Specify random lengths wherever possible. Also state finished part length so the mill may ship tubes which might otherwise be scrapped.

—Furnish drawing of finished part when tubes are to be machined on outside diameter or inside diameter or both. If drawing is not available, state finished dimensions after machining. In specifying the rough tube size, eccentricity and decarburization must be considered.

—When tubes are to be deformed (bent) or otherwise specially treated, furnish the mill with full information so that correct temper will be supplied.

—Stipulate government (A-N) or AMS specifications (number) wherever possible and do not make "commercial" references because they may be misleading.

—The following is to be indicated and grouped together on every purchase order: Preference rating; contract number; group classification (see general preference order M-21); purchaser's symbol (see priorities regulation No. 10); end use; identifying S-U number (scheduling unit form 18); statement that delivery requested is not in anticipation of actual requirements.

—Indicate destination and routing of material.

—Indicate whether or not government inspection is required and at which point this inspection will take place.

—Specify number of invoices and test reports, if any.

—On welding tubing, specify inside flash condition, if this is not covered in the particular specification to which the material is ordered.

DEFINITIONS:

Aircraft Tubing: This term designates a tube with size, analysis, mechanical properties, and surface finish suitable for use in fuselage or airframe construction. Seamless tubes for this purpose are always furnished cold drawn and electric welded tubing for this application is made only from cold rolled strip. Special processes and quality selection have been established for the manufacture of aircraft tubing. It is supplied either annealed, normalized or specially heat treated and is commonly used in the condition as supplied by the manufacturer. However, in some cases, such tubes may be deformed, partially machined, ground or heat treated by the user.

Aircraft tubing is usually ordered to government specifications (AN) or specifications promulgated by generally recognized agencies.

Aircraft Mechanical Tubing: This term designates a cold drawn or hot rolled tube of analysis and internal steel qualities suitable for use in the aircraft industry in manufacturing axles, shock absorbers, landing gear struts, motor parts or other similar applications. Magnaflux aircraft quality steel is recommended for the manufacture of these parts by the tube mill. However, both magnaflux aircraft quality and commercial steel grades are being widely used.

Such tubes will have a relatively wide tolerance range, will be furnished with commercial surfaces, and special processing or selection is not required because the outside surface or the inside surface or both surfaces are completely machined by the user. Regular commercial standards of processing in effect for ordinary mechanical usages are employed by the tube mill. New AMS (Aeronautical Material Specifications) for this class of tubing are listed below:

Explanation of specifications of seamless aircraft tubing listed in Table I follows:

AN-WW-T-846: Covers 1025 steel used to limited extent in aircraft.

AMS-5075: Generally similar to AN-WW-T-846 except closer carbon range (0.21 to 0.29 per cent).

AN-WW-T-850a: This specification is for Army, Navy and general use and is the one principally employed for the purchase of seamless X-4130 round, square, rectangular, oval and streamline aircraft tubing. It provides for furnishing tubes annealed, in condition *N* (normalized or cold drawn and stress relieved), or heat treated to various quenched and tempered mechanical properties. Unless otherwise ordered, the tubing is supplied in condition *N*.

Special operations such as bending or otherwise deforming, etc., are sometimes performed on tubes ordered to this specification. Such tubing is usually furnished in condition *A* (annealed) and the purchaser should furnish full information on his order when he intends to make special application of such tubing.

AMS-6360A: Similar to AN-WW-T-850a but differs in grain size and specification details. It has been employed principally by motor manufacturers but the quantity of tubing ordered to this specification has been small when compared to that ordered to AN-WW-T-850a.

Indicates magnaflux testing:

AMS-6361, 6362, 6363: These are similar to 6360A but provide for 125,000, 150,000 or 180,000 pounds per square inch minimum tensile strength.

AN-WW-T-852a: Similar to AN-WW-T-850a except requires X-4135 steel and was written primarily to cover relatively heavy wall tubing.

AMS-6365: Similar to AN-WW-T-852a. Same comments apply as made regarding 6360A.

AMS-6366, 6367, 6368, 6369: Same as AMS-6365 except provision is made for 125,000; 150,000; 180,000 or 200,000 pounds per square inch minimum tensile strength.

M-491: Navy specification covering X4340 steel for high strength structural parts.

AMS-5050: A low carbon analysis of special manufacture generally used for motor oil lines, hydraulic lines, intake tube, etc.

Seamless Stainless Aircraft Tubing:

AN-WW-T-855: (with amendment 1) This specification is for 18-8 straight analysis for general corrosion resistance where no welding is encountered except spot welding. Material is supplied an-

(*Please turn to Page* 134)

NOTHING MECHANICAL IS IMPOSSIBLE

That's a challenging statement, but our experience has proved it true. We've tackled jobs which some experts had declared impossible yet we accomplished the desired results... jobs involving single mechanical parts and also complete assemblies. We did the impossible.

Long before Pearl Harbor we amazed many manufacturers by reducing the number of parts in their assemblies; doing tooling which made inventors' dreams realities; straightened out and speeded production through ingenuity.

Right now we're producing aircraft armament devices 24 hours a day, seven days a week—precision work of the highest type—automatic bomb-release racks and shackles. And we're delivering them on time with a remarkably low percentage of rejections... that's Spriesch miracle war production.

After Victory we'll be able to help you—whether you be the executive of a large plant seeking an idea for putting into production a small mechanical part or a complete assembly; whether you are seeking an establishment with complete facilities for ingenious manufacture; whether you wish someone to develop and supply needed tools.

We invite you to study our plant and our spirit. We are confident we can help you, no matter where your plant is located. Write us (on your business letterhead, please) for our 36-page brochure "Ingenuity."

Joseph J. Cheney
President

WE OFFER INGENUITY...
and extensive facilities to produce intricate or simple designs—experimental pieces or mass production—complete assemblies or parts with maximum accuracy, minimum waste at reasonable cost.

★ ★ AFTER VICTORY ★ ★

Spriesch

ESTABLISHED 1923

TOOL & MANUFACTURING CO., Inc.

22 HOWARD STREET • BUFFALO, NEW YORK

Ad No. 14

INDUSTRIAL EQUIPMENT

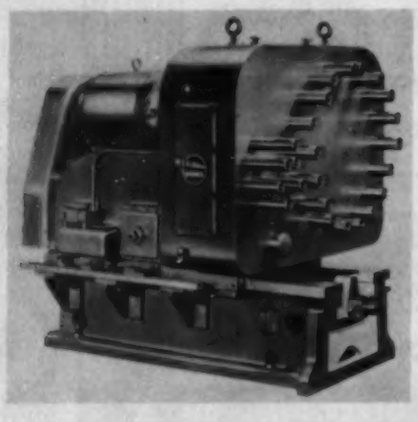
Safety Helmet

H. Apelt Importing & Trading Co. Inc., 155 John street, New York, announces a new fiber safety hat capable of withstanding on its crown the impact of an 8-

pound ball dropped from height of 5 feet. It features a flexible brim which will not break under a sharp blow, and is fitted with strong, shock absorbing material. Headpiece is of waterproof material. It also is a nonconductor of electricity.

Drilling Machines

W. F. John Barnes Co., Rockford, Ill., is offering new hydraulically actuated units for drilling 360 degree revolving turrets on Army medium tanks. One unit is equipped with 25 spindles and the other with 24. Those on the 24-spindle head are arranged with 18 spindles equally spaced about a circle and 6 spindles in a cluster. Heads on



both types of machines are equipped with antifriction bearings, hardened alloy steel gears, and heat-treated spindles and shafts.

Portable Elevator

Revolvator Co., North Bergen, N. J., is introducing a special telescopic industrial elevator featuring an extreme lift of 54 feet. It is readily portable on ball-bearing casters and may be steered from either end.

A 1½-horsepower motor, part of the elevator's equipment, lifts two men and equipment to the full height in less than 5 minutes. The elevator consists of five telescoping sections which collapse to a height of 11 feet 9 inches. It is of structural steel, welded together and braced. Its platform at top is 54 x 86 inches and is supplied with folding type 42-inch railing and 6-inch toe board.

Platform and sliding frames are suspended, lifted and lowered by four roller-type lifting chains, each of not less than 6600 pounds tensile strength. A ladder is included to all sections at any height and a trap-door in platform.

The 66-inch by 10-foot base frame is

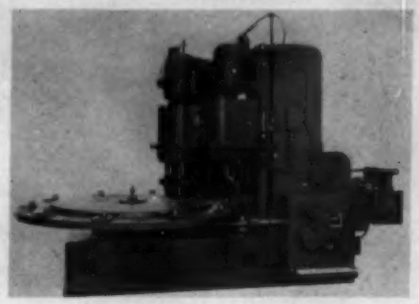
equipped with auto type steering mechanism, tow-bar and instantaneous type floor lock. Wheels, running on ball bearings, are 12 inches in diameter and are equipped with four leveling screws. Push-button control system consists of momentary type push buttons on platform railing and on frame of machine within reach of floor.

Button stations on frame and railing are inter-locking, the set on platform being equipped with safety device to prevent operation of station on frame below. Base section is enclosed with an expanded metal screen with hinged openings for access to motor compartment. Outriggers with a 16-foot spread provide added steadiness to the extended elevator.

Countersinking Units

Baker Bros. Inc., Toledo, O., recently built, with the use of its standard designs, three special machines for use in the production of tanks. Unit illustrated consists of two 26-HO hydraulic feed machines with multiple heads mounted on special bases around a power automatic index table. It is used for drilling and countersinking 40 holes on the 78,750-inch cycle of a tank's turret ring.

The other two machines are used for counterboring or countersinking and tap-



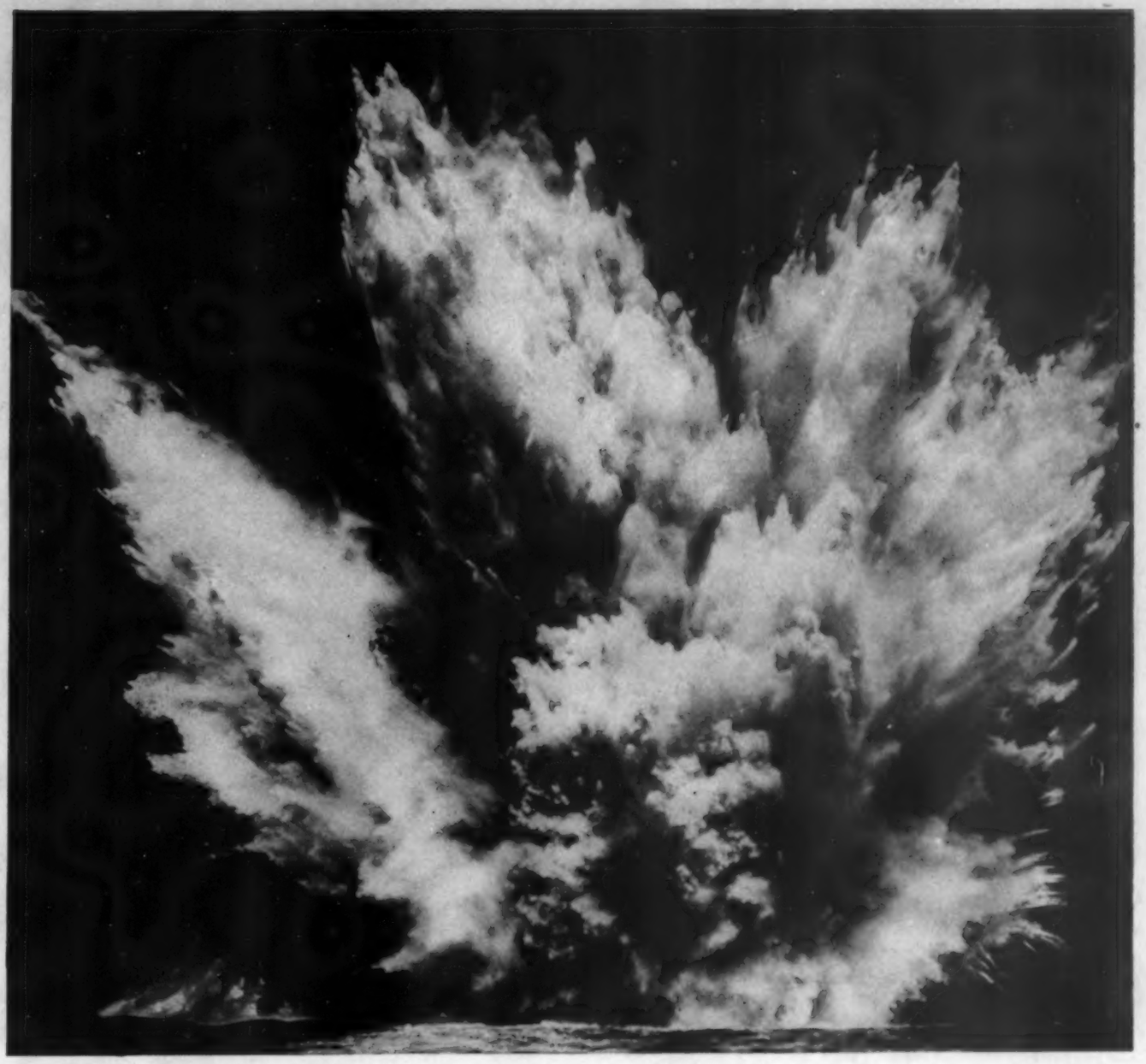
ping 48 holes in certain other sections of the ring. One of these uses one 26-HO hydraulic feed machine fixed on a special base with special work table carrier. The other consists of one 26-HO machine with multiple spindle head for drilling and chamfering operations of holes, with a special design automatic tapping unit. All three machines are entirely automatic in cycle. It is only necessary for operator to chuck rings from proper locating points and clamp. The machine then automatically, after being manually started by operator, continues in cycle until all operations have been performed.

Duct Clamp

Marman Products Co., Inglewood, Calif., is offering a new type air and oil duct clamp reported to facilitate certain phases of aircraft production. Tests show it to have a positive equalized circumferential loading that exerts equal pressure at every point. Also it can be used over and over as its clamping effi-

ciency is maintained indefinitely, according to the company.

The clamp is especially built for high pressure hot or cold installations for aircraft, automotive, tank or marine engines and assemblies. Its diameter sizes (1⅜ to 38 inches) conform to any con-



Air Conditioning gives it OOMPH!

This war is being fought with *explosions*. All kinds...from block-busters to hand grenades. And don't forget the explosions in the barrels of guns that propel bullets and shells toward the enemy.

It takes a lot of skill to make a good explosion. Air conditioning helps.

The rate at which powder *dries* determines the way it explodes. It must not explode too soon or too late. Hence, special air conditioning . . . with temperature and humidity controlled precisely . . . is used for the drying of powder.

Also, air conditioning protects the lives of workers in munitions plants by providing the safest temperature and humidity conditions.

General Electric is an outstanding supplier of the new improved kind of air conditioning equipment needed for these wartime requirements. It has developed equipment more flexible, more compact than ever before . . . with more accurate temperature and humidity control.

Today this equipment is being devoted to winning the war. After the war, a far better air conditioning will be made available for offices and factories, stores and theatres; homes, hospitals and hotels . . . from General Electric.

Air Conditioning and Commercial Refrigeration Department, Division 433, General Electric Co., Bloomfield, N. J.

Air Conditioning by GENERAL ELECTRIC

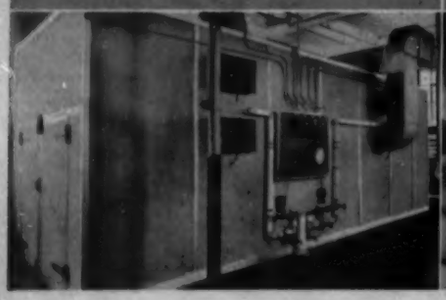
One of the major developments of wartime industry is the speedier adaptation of inexperienced manpower to the handling of exacting production operations. This is how it is done today in many warplants.

Every operation and process demanding critical temperatures, pressures or flow rates is reduced to simple routine by installation of precision Foxboro Measurement or Control Instruments. Automatically, workers are continuously supplied with exact measurements to guide them . . . graphic records are provided wherever needed . . . manual control is completely replaced in many instances. Each production step is so simplified that even "green hands" take hold *fast* . . . produce accurately, in paying quantity, after only brief training!

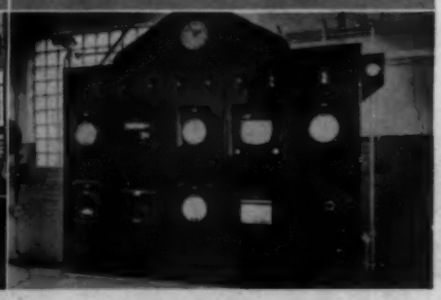
Make this note for post-war planning! "Investigate Foxboro Instrumentation as a means to improve production quality or efficiency." **The Foxboro Company, 118 Neponset Avenue, Foxboro, Mass., U. S. A.**

FOXBORO
Reg. U. S. Pat. Off.
MEASUREMENT AND CONTROL SYSTEMS

Typical installation of automatic Foxboro Control on dehydrator for speedy, uniform production of dehydrated foods.



Foxboro Control developments in installations like this have made possible new techniques in aviation gasoline refining.



vex surface, whether square, oblong, circular or triangular. Its design permits it to be quickly and easily wrapped around a hose and duct section without its removal and tightened the desired amount with one hand, it is said.

Carton Stitcher

Acme Steel Co., 2840 Archer avenue, Chicago, is offering a new carton stitcher for stitching carton tops at higher speeds. Known as the seam Silverstitcher, it is especially efficient when employed on straight line production. A vertical roller guide and unique arrangement of the seam unit assure tight, positive closure for the carton top.

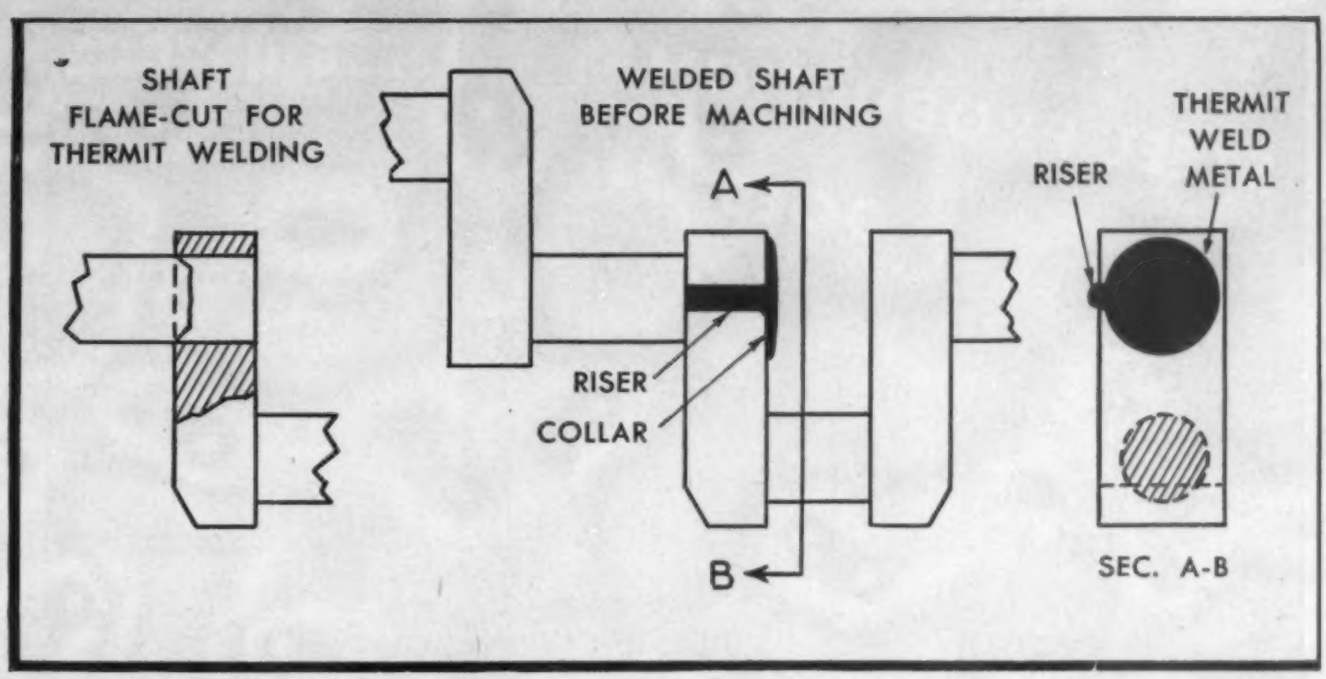
Power driven, the machine can form and drive as many as 285 steel stitches per minute, drawing the necessary material from a large, continuous 10-pound coil

of wire. The stitching mechanism is halted quickly or put into operation by means of a solenoid control. To complete the stitching operation swiftly, the carton flaps are slipped through an open head device. Since the table and the vertical roller guide are adjustable, the machine can accommodate containers of varying depths and widths.

Bomb-Fire Extinguisher

American - LaFrance - Foamite Corp., Elmira, N. Y., announces a new pump tank fire extinguisher for use on incendiary bomb fires. It produces a straight stream and not a spray. This is in compliance with the latest requirement of the Office of Civilian Defense for controlling magnesium type incendiaries.

Pump tank is made in 5 and 2½ gallon sizes. It features an over-size air chamber assuring minimum pulsation, a steady pressure. Its range is 30 to 40



REPAIRING MECHANICAL JOINTS IN CRANKSHAFTS —*with THERMIT WELDING*

WITH the heavy loads and full time usage imposed on all machinery these days, breakdowns due to mechanical failures are becoming more frequent. On large crankshafts, fabricated in two or more pieces, the breakdown frequently occurs where it has been mechanically joined by the use of keys and key-ways. Thermit Welding is being employed in such cases for a permanent repair, trouble-free for the life of the shaft itself. ¶ There are hundreds of other ways that Thermit Welding can and is being used today to reduce shut-downs due to breakage of vital machinery. ¶ With the Thermit process, the molten metal necessary for the complete replacement or repair of the damaged section is poured in a single operation, fusing the parts into a homogeneous unit that is stronger and sounder than a similar section of the original forging. Preparation time is reduced to a minimum, as positioning or preliminary machining is unnecessary. Neither is any stress-relieving required. The entire operation can usually be completed in a day or two, except for very large welds. ¶ *Write for booklet, "Thermit Welding," showing how the process can be utilized in fabrication work as well as repair.*

METAL & THERMIT CORPORATION

Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.

THERMIT WELDING

120 BROADWAY, NEW YORK

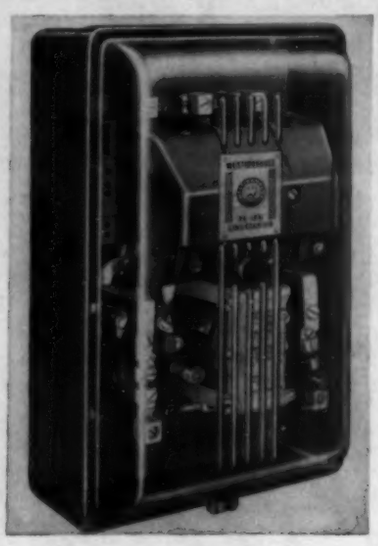
ALBANY • CHICAGO • PITTSBURGH
SO. SAN FRANCISCO • TORONTO

STEEL PRODUCTION GOES UP . . .
when
LAMSON
is on the Job!
It's vital in production of specification steels that hot steel samples get to the laboratory for testing as fast as possible. Lamson Pneumatic Tubes have solved this problem for America's leading mills—rushing these small ingots right from the furnace floor to the laboratory, often a half-mile away. Special Steel Mill Carriers, with their hot samples, weigh up to 10 pounds, yet they travel 20 feet a second!
Lamson Pneumatic Tubes amortize the investment in but a few months. They reduce over-all time of heats—give better control of production—increase tonnage per month—save great amounts of man-hours and messenger service, at a time when every worker counts!
And Lamson Tubes will speed YOUR output too—by rushing anything from blueprints to tools throughout your plant . . . sizes to fit special requirements. Write for Wartime Tube Bulletin ST-3.
Among those now using this Lamson Service: American Rolling Mills—Bethlehem Steel—Babcock-Wilcox—Blaw-Knox—Carnegie-Illinois Steel—Dominion Iron & Steel—Youngstown Sheet and Tube—National Malleable Steel & Casting.
LAMSON CORPORATION
Syracuse, N. Y.
Makers of Conveyors and Pneumatic Dispatch Tubes

feet. The unit is equipped with a standard 26-inch hose and its interior is treated with a corrosion-resisting coating. The outside finish is of red enamel also designed to repel corrosion and to make its identity immediate.

Linestarter

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is offering a new size 2 class 11-200 linestarter requiring less than half the mounting space of former units for machine tools, textile machinery, pumps, fans and similar machines. It is designed for group mountings, built-in applications or remote mountings, and



features a new clapper-type armature with knife-edge bearings.

Double-break silver to silver contacts are used, thus eliminating shunts and reducing maintenance. Overload relays are reset either by hand or automatically. On applications requiring sequence or auxiliary interlocking, provision is made on the unit for a total of four normally open or normally closed electrical interlocks.

Heat Treating Furnace

H. O. Swobada Inc., 142 Thirteenth street, New Brighton, Pa., is offering a new Falcon high temperature salt bath electric pot-type furnace for cyanide hardening of tool steel products. Designed for production work and general shop heat treating, it is not only suitable for cyanide hardening but also regular thermal hardening as well. Its operating temperature is 1650 degrees Fahr.

The furnace is provided with throttling-type automatic controls, including a potentiometer-type control pyrometer with an input regulator. A contactor is also provided for carrying the furnace load.

The furnace casing is of steel with an

COOPER-BESSEMER in ACTION for VICTORY...

Everyday performance

EVERY day more Cooper-Bessemers leave for the production front . . . gas compressors, air compressors, gas engines, diesel engines, foundry products.

Every day on the production front, Cooper-Bessemers are delivering maximum work output . . . with minimum attention for maintenance and repair . . . efficient, dependable, economical.

If it's a Cooper-Bessemer, it can and will work a 168-hour week, because it is designed and built to give outstanding performance through a long lifetime of service.

The photograph shows one of fifty huge 10-cylinder G-MV gas engines, ready to go to one of America's busiest war industries.

THE Cooper-Bessemer CORPORATION
MT. VERNON, OHIO GROVE CITY, PA.

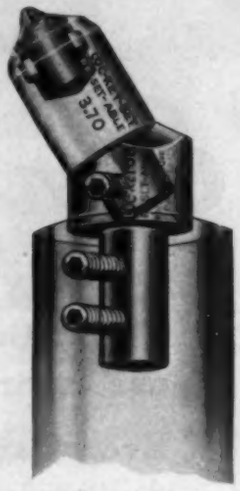
BUILDERS OF DEPENDABLE ENGINES FOR 110 YEARS

alloy pot which is suspended from the casing into the furnace chamber by means of a heavy cast intermediate ring. Pot dimensions are 16 inches inside diameter by 18 inches deep. Heating elements are supported in open face grooves in high grade refractory heater plates.

Brick and block type heat insulation is used throughout. Terminals are brought out through the casing into an enclosed terminal box located on the back of the housing so that there are no exposed electrical connections at any point on the furnace. Capacity of the unit is 30 kilowatts, 220 volts, single phase current. According to the manufacturer, it also can be connected for use on a 3-phase current.

Angle Set Tool

Diamond Tool Co., Chicago, announces a new 30-degree angle-set attachment for dressing 2-inch radius from a templet with 3 to 4 karat common quality diamonds. It enables bullet nose grinders, using centerless grinders with the templet attachment, to use common



quality diamonds to form wheels by dressing from 1 to 6-inch radius.

The mean fixed position left or right in which the diamond nib is held, it is said, prevents wear to the setting in this dressing operation and eliminates hazardous use of thin diamonds and weak points for dressing. An important feature of the new tool is it permits rotation of nib to re-sharpen diamond.

Facing Tool

Robert H. Clark Co., 3424 Sunset boulevard, Los Angeles, is offering a new surface facing tool to take the place of standard end mills and shell end mills for surface facing. It consists of a tapered (or straight) shank and body with three adjustable high speed bits, which

SPEED CASE STEEL
A LOW CARBON OPEN HEARTH PRODUCT

ONE *Steel that gives you . . .*

1. High Speed Machining
2. Greatly Increased Tool Life
3. Smooth Finished Parts
4. High Physical Properties
5. Excellent Impact Resistance
6. Good Torsional Values
7. High Case Hardness
8. Great Core Toughness
9. Reduced Carburizing Time
10. Unusual Ductility
11. Minimum Distortion

SPEED CASE STEEL Machines from 225 to 275 S.F.P.M. with excellent TOOL LIFE and *Smoothly Finished Parts*

★ Write us for full details. . . . Our metallurgists are at your service.

BUY WAR BONDS

Licensee for Eastern States
THE FITZSIMONS COMPANY
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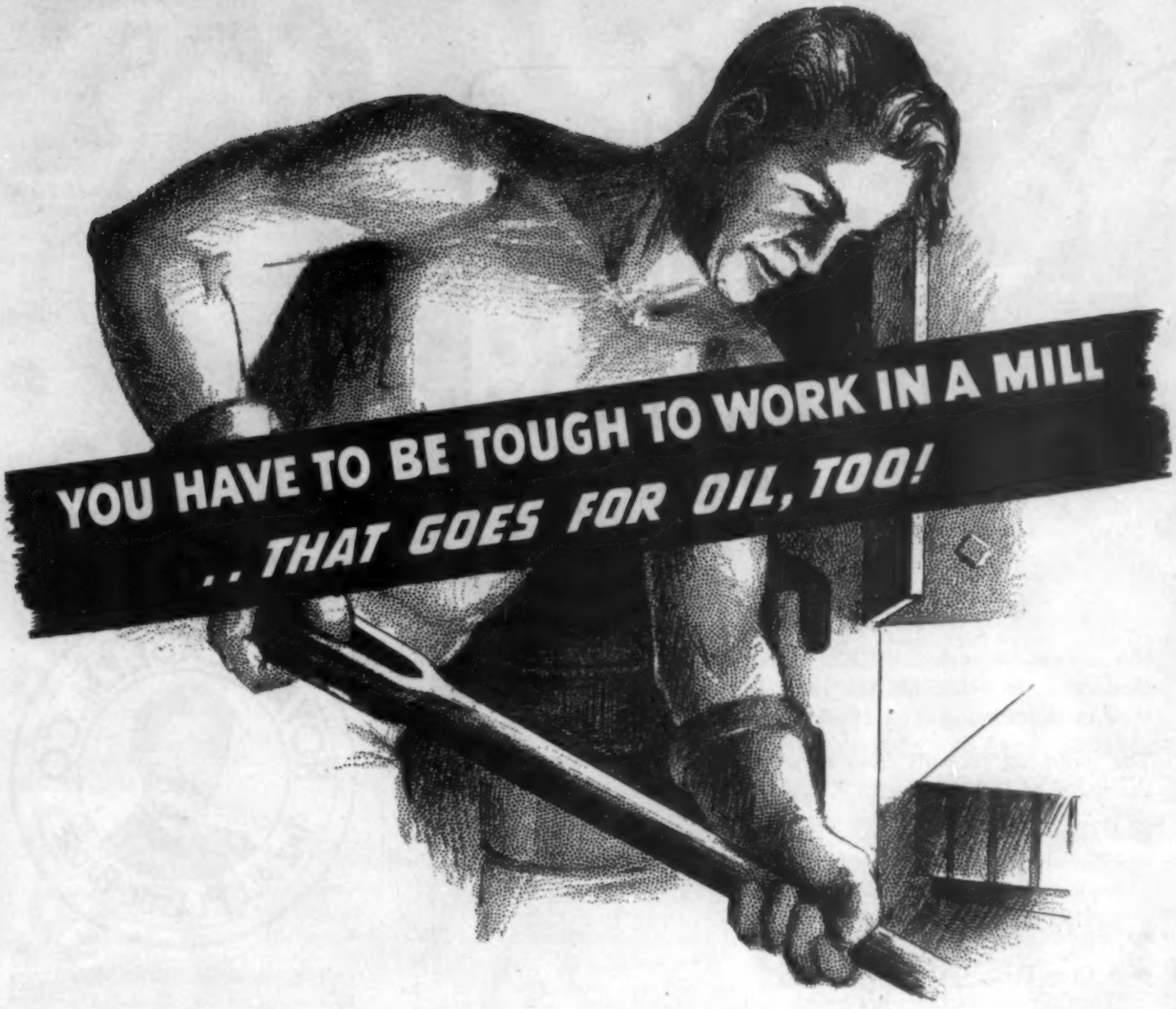
Licensor
MONARCH STEEL COMPANY
HAMMOND • INDIANAPOLIS • CHICAGO
PECKOVER'S LTD. Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS



Today, with steel production tremendously increased, industrial oils must be as tough and rugged as steel itself—to keep up with the pace of production!

In the severest on-the-job tests, in mill, after mill throughout the Nation, Cities Service oils have proved *precision-perfect* —in meeting the exacting standards required in steel making.

Whatever your problem—quenching, heat-treating, machining, scale formation or rust prevention—Cities Service engineers are ready to help you with expert counsel and quality products.

For this service, simply call your nearest Cities Service office.

THE INDUSTRIAL HEAT PROVER

The Cities Service Industrial Heat Prover enables those engaged in the oxygen control of furnace atmospheres to achieve certain physical results desired in the processing of metal, or in the control of the amount of combustibles present. Recordings are continuous and almost instantaneous. If you are not already familiar with this instrument and the outstanding service it is performing for Industry, write for our descriptive booklet to Cities Service Oil Company, Room 1342, Sixty Wall Tower, New York, N. Y.

OIL IS AMMUNITION—
USE IT WISELY!

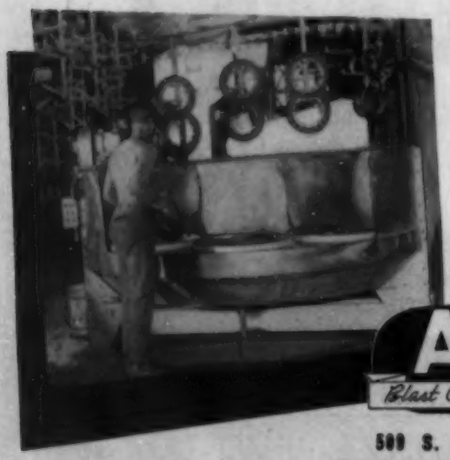
CITIES SERVICE OIL COMPANY
NEW YORK · CHICAGO
IN THE SOUTH
ARKANSAS FUEL OIL COMPANY
SHREVEPORT, LA.

How the *Airless* WHEELABRATOR is Setting the Pace in Metal Cleaning Production

WE recently mailed a questionnaire to 100 users of the airless WHEELABRATOR, engaged in important war production, to determine the value of Wheelabrating in speeding up their metal cleaning production.

The following excerpts from these replies tell their own story about the speed of WHEELABRATOR airless blast cleaning:

- **A Gear Manufacturing Co.:** "The Wheelabrator has increased our production speed 2 to 3 times over previous methods."
- **A Drop Forge Co.:** "The use of Wheelabrator machines has speeded up production approximately 50%."
- **A Large Electrical Mfg. Co.:** "Wheelabrators are 3 to 4 times as fast as other methods previously used in our plant."
- **A Large Truck Mfg. Co.:** "The cleaning is done in one-tenth the time formerly required."
- **A Large Machinery Mfg. Co.:** "We estimate Wheelabrator has increased our production from 6 to 8 times over previous methods."
- **A Large Foundry:** "Wheelabrator has increased production approximately 75%."
- **An Aircraft Engine Mfg. Co.:** "Has increased production at least 20 times."
- **A Large Valve Mfg. Co.:** "Our Wheelabrator has increased production speed over previous methods 200 to 300%."



AMERICAN FOUNDRY EQUIPMENT CO.
Blast Cleaning and Dust Control Engineers

500 S. BYRKIT ST., MISHAWAKA, INDIANA

World's Largest Builders of Airless Blast Equipment

may be set for any diameter within its range. With only four tools, any diameter from 1 to 4½ inches inclusive may be obtained without being limited to standard fractional dimensions. A measuring gage is provided with each tool to aid in making quick and accurate size adjustments. Bits can be reground easily or can be replaced.

All-Plastic Badge

Royal Emblem Co., 36 John street, New York, announces a new type Plastic-seal all plastic identification badge for war workers which, it is said, will save approximately one ton of much needed metal on every 40 thousand made.

All the attributes wanted in a badge are included in this development—thin, durable, strong—keeps its shape—non-burning, nonsparking, nonmagnetic, no sharp edges and it meets government requirements. The badge is but ⅛ inch thick and so light that, when attached to any light weight material, is does not hang in an unsightly manner.

Made in two parts, it is claimed to be completely tamper-proof. Laminated construction of the component parts is so integrated that any attempt to take the badge apart, would so completely mutilate the component parts, so as to make them entirely unusable.

Coolant Strainers

Metal Textile Corp., Orange, N. J., announces two new model super-capacity coolant strainers—G and H. The first, the grinder model, provides an unusually high capacity, made possible by a combination of three filter elements.

Essential function of this unit is to prevent chips or particles from being recirculated in the coolant flow and to avoid scoring or other defective workmanship in the grinding operation. When

installed in the sump tank, before the circulating pump, the strainer offers the additional advantage of keeping the pump free of chips or lint.

Installation requires one pipe connection. In cases where the size of the coolant tank will not accommodate a triple-unit filtering element, model H, single unit, strainers may work out satisfactorily. Should the capacity in gallons

per minute indicate that two or more filtering elements are needed, as many model H units as required may be installed in any position in the tank where space is available. Capacities of the model G strainers range from 15 to 60 gallons per minute. Various sizes of the model H are suitable for capacities from 5 to 20 gallons per minute. Strainer illustrated is of the model G.

Electrode Holder

Jackson Products, Detroit, announces a light slender, arc welding electrode holder designed especially for aviation welding, but not restricted to that field. Known as model F-1, it is of special high conductivity copper alloy, has a rated

capacity of 200 amperes. It takes rods from the smallest up to $\frac{1}{8}$-inch, has an overall length of 7⅞-inch and weighs 12 ounces. Insulated, it protects the welding operator's eyes against flash.

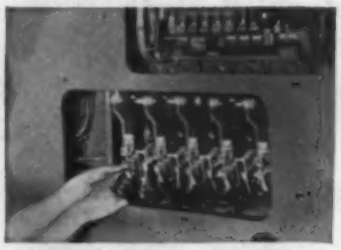
Grinding Wheel

Sterling Grinding Wheel Division, Tiffin, O., announces a new grinding wheel for use with tool steels. It features a back plate constructed of flexible light weight material said to lengthen the wheel's life and improve its cutting action. The wheel employs no steel or rubber, allowing quicker delivery dates.

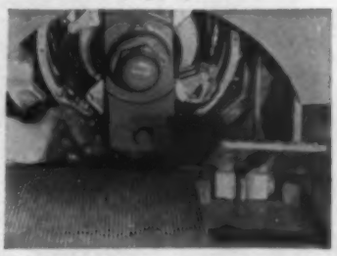
How to keep Your Trucks Running FOR THE DURATION

● Proper maintenance of industrial trucks always pays dividends, but today it becomes a deciding factor in the success of our war production effort. Most truck failures can be avoided by routine care and maintenance.

Correct lubrication according to manufacturer's instructions is an essential phase of truck care.



Control equipment should be inspected monthly. Here mechanic is replacing a finger tip.



Dust covers should be removed monthly to inspect commutators and brushes... Brushes should have at least 60% bearing surface.

Removing the rotor disc from the magnetic disc brake for monthly inspection.

First—Provide good floor conditions and DO NOT overload.

Second—Place trucks under the supervision of a competent mechanic.

Third—Lubricate regularly as instructed by manufacturer.

Fourth—Keep a record sheet covering weekly inspection findings, lubrications, adjustments, repairs. Thus excessive wear can be spotted and serious damage overcome.

ROUTINE SCHEDULE FOR TRUCK MAINTENANCE

Every Week. *BRAKES*—Test service brakes for stopping with maximum load, and parking brakes for holding on steepest incline. Adjust as required. Inspect linings—if dirty or greasy, wash in gasoline, if worn, replace.

STEERING CONNECTIONS—Test for:

a) Lost motion at ball joints and rod yokes due to wear.
b) Tight joints at rod yokes due to bent levers or rods.
c) Misalignment of steering wheels.
d) Worn bearings in steering post or ball crank.

Make adjustments according to instructions, and replacements as required. WHEEL ALIGNMENT—Follow manufacturer's instructions for checking and lining up wheels on each type of truck. LIFT OR HOIST—Clean grease and dirt from rails, inspect chains, anchor bolts, hydraulic system, and limit switch. Use neatsfoot oil to keep leathers soft. LUBRICATION—Follow manufacturer's instructions for points requiring weekly lubrication. ELECTRICAL EQUIPMENT—If working in dusty environment, remove covers from motors and electric controls, and blow out dust.

Every Month—Monthly inspection covers the most important mechanical parts of truck: power axle, wheel bearings and universal joints, spindle bearings, drive and torque yokes, Oldham coupling, trailing axle and wheels, brake drum, motors, brushes, controller, contactor, limit switches, hydraulic lift. Repairs on these parts are costly. Do not slight any part that requires lubrication. Keep moving parts free from dirt and grease. Follow detailed instructions from manufacturer.

Maintenance check list is available in bulletin form. Write for your copy or copies today.

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
2167 WEST 25th STREET • CLEVELAND, OHIO
In Canada: Railway and Power Engineering Corp., Ltd.

Baker INDUSTRIAL TRUCKS

Make safety simple for inexperienced men

If your men can be trained TO LET THE LOAD REST IN THE CURVE OF THE HOOK, NOT ON THE POINT—equipment will be preserved and accidents prevented. In most instances it's easy to follow this simple rule. But new men need to be told about this and other precautions which save lives, save money, and speed war production. We'll gladly supply information if you're interested.

The highest possible preference rating should be obtained and shown on orders placed for chain.

AMERICAN CHAIN DIVISION

York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT, CONNECTICUT

In Business for Your Safety

Aircraft Manual

(*Continued from Page* 122)

nealed or quarter-hard.

AN-WW-T-858: (with amendment 1) Provides for a columbium titanium stabilized 18-8 used for corrosion resistance where welding is likely to be used. Supplied annealed only.

AMS-5570B: Similar to AN-WW-T-858.

Seamless Aircraft Mechanical Specifications:

(For axles, struts, machine parts, etc.)

AMS-6371: SAE X-4130 cold drawn or hot rolled tubes.

AMS-6381: SAE X-4140 cold drawn or hot rolled tubes.

AMS-6413: SAE X-4335 cold drawn or hot rolled tubes.

NOTE: Other grades of steel may be ordered to the above specifications but mechanical properties will vary with analysis.

Welded Aircraft Tubing:

(Carbon and Alloy—except Stainless)

TABLE I—Aircraft Tubing Specifications

AIRCRAFT TUBING

(Airframe or Fuselage Round, Square, Rectangle, Oval and Streamline)

Seamless:

(Carbon and Alloy except Stainless)

Specification No.	Analysis
AN-WW-T-846	1025
AN-WW-T-850a	X-4130
AMS-6360A	X-4130
AMS-6361	X-4130
AMS-6362	X-4130
AN-WW-T-852a	X-4135
AMS-6365	X-4135
AMS-6366	X-4135
AMS-6367	X-4135
AMS-6368	X-4135
AMS-6369	X-4135
AMS-5050	1010
M-491	X-4340
AMS-6365	X-4130

Welded:

AN-T-3	X-4130
AN-T-4	1025
AMS-5077	1025
AMS-6510	X-4130
USA-10245	1025
AN-WW-T-833	X-4130
Dept. of Commerce P+P 10-2	E-4130 and 1025
AMS-5053	1010

STAINLESS TUBING

Seamless:

AN-WW-T-855	18-8
AN-WW-T-858	18-8 stabilized
AMS-5570B	18-8 stabilized

Welded:

AN-WW-T-861	18-8 stabilized
AMS-5575A	18-8 stabilized

AIRCRAFT MECHANICAL TUBING

Hot Rolled or Cold Drawn

(Axles, struts, machined parts, etc.)

Round tubes only

Seamless:

Specification No.	Analysis
AMS-6371	X-4130
AMS-6381	X-4140
AMS-6413	X-4335

Note: All specifications prefixed by AMS apply to Aeronautical Material Specifications published by the Society of Automotive Engineers. (See STEEL, Sept. 7, 1942, p. 78.)

AN-T-3: This specification is for Army, Navy and general use and is the one principally employed for the purchase of welded X4130 round, square, rectangular, oval and streamlined aircraft tubing. It provides for furnishing tubes annealed, in condition *N* (normalized or cold drawn and stress relieved), or heat treated to various quenched and tempered mechanical properties. Unless otherwise ordered, the tubing is supplied in condition *N*.

Special operations such as bending or otherwise deforming, etc., are sometimes performed on tubes ordered to this specification. Such tubing is usually furnished in condition *A* (annealed) and the purchaser should furnish full information on his order when he intends to make special applications of such tubing.

AN-T-4: 1025 round, rectangular and square aircraft tubing.

AMS-5077: 1025 round, rectangular and square aircraft tubing.

AMS-6510: X-4130 round aircraft tubing.

USA-10245: 1025 tubing for gliders only. Tubes are furnished as welded, or cold drawn and annealed, as ordered.

AN-WW-T-833: 75 per cent nickel, 14 per cent chromium, 9 per cent iron alloy for aircraft use.

Department of Commerce P-P 10-2: Covers 1025 and X4130 as ordered; however, these specifications have been superseded by AN-T-3, AN-T-4.

AMS-5053: Low carbon analysis of special manufacture generally used for motor oil lines, hydraulic lines, intake tubes, etc.

Welded Stainless:

AN-WW-T-861: 18 Chromium 8 Nickel corrosion and heat resisting steel —stabilized with columbium or titanium.

AMS 5575A: Similar to AN-WW-T-861.

Grinding Wheel Manual

Grinding Wheels and Their Uses, second edition; by Johnson Heywood, under auspices of the Grinding Wheel Manufacturers Association; cloth, 436 pages, 6 x 9 inches; published by the Penton Publishing Co., Cleveland, for $3.

Improvements in grinding machines and wheels since the first edition was published in 1938 led to need for a revision. The later edition contains much new material, including several additional chapters. Where older methods have been improved the old descriptions have been dropped and new matter substituted. More stress has been laid on ingenious knacks for solving difficult grinding problems and on designing parts to permit their being ground instead of being machined by other methods.

Central Station Operation

R-S Car Hearth Furnaces have been built with motorized door lift, furnace cars and transfer car, all operated from a central control station. The conservation of time and labor in such streamlined installations is readily apparent, particularly when a charge is to be quenched and rapid movement is necessary.

The shop crane is ready to pick up the charge as soon as the car is out of the furnace and there is no time lost in manipulating cables or snatch blocks. Write for details and illustrated R-S Car Hearth Bulletin No. 68-F.

FURNACE DIVISION
R-S PRODUCTS CORP.
122 Berkley Street
Philadelphia, Pa.

R-S Furnaces of Distinction

ANNEALING CONVECTION CAR HEARTH
ROTARY HEARTH CONTINUOUS CONVEYOR SALT BATH
FORGING METAL MELTING PLATE AND ANGLE HEATING

BUY WAR BONDS

NE Alloy Steels

(*Continued from Page* 102)

of the end-quench on Jominy hardenability test are covered in the 1942 *Society of Automobile Engineers' Handbook*, pages 315 to 324 inclusive. It has also been detailed in other articles on NE Steels.

Briefly, this test consists of water quenching a 1-inch round bar at one end and measuring the hardness 1/16-inch under the surface along the bar, commencing 1/16-inch from the quenched end and at 1/16-inch intervals.

As each 1/16-inch from the end of the bar represents a definite cooling rate, the data from this test can be compared with the data obtained from cylindrical bars of various diameters quenched on all surfaces.

Figs. 9 and 10 give the hardenability values for NE-9440 and NE-9640 when end quench over a temperature range from 1450 to 1650 degrees Fahr.

Figs. 11 and 12 give hardenability values for NE-9440 and NE-9640.

The data in Fig. 13 are taken from end-quench specimens arranged so that the comparative hardenability of each alloy composition can be observed. It should be understood that these values vary widely within each alloy composition range, depending on whether the alloys are on the high or low side of the range.

The hardenability data in Fig. 13 can be used to determine the maximum bar size for which the tensile properties would apply, based on the assumption that the tensile properties are applicable only when the steel quenches out to 50 rockwell C or more. See Table III.

It will be noted that NE-9440 and NE-9640 are comparable with A-2340, 3140, 4140, 4640 and 5140. A-4340 has considerably more hardenability than NE-9440 and NE-9640.

Fig. 14 gives a rough sketch of some parts now made from NE-9440 steel. Further details covering the manufacture of these parts are given in Table IV. The following additional data refers to these parts as described in Table IV:

Item 2: The hot rolled bars used for hot forming the U-bolts were from a heat analyzing—carbon 0.42 per cent; manganese 1.02; silicon 0.48; nickel 0.30; chromium 0.34; molybdenum 0.13. This heat was fine grained after 8 hours at 1700 degrees Fahr. The formed and threaded U-bolts were heat treated by quenching in oil from 1550 degrees Fahr. and tempering at 950 degrees Fahr. Hardness was then 276 to 290 brinell, specified range being 229 to 299 brinell.

Item 4: Analysis of NE-9440 steel used for Item 4 was carbon 0.42; manganese 1.10; silicon 0.49; nickel 0.32; chromium 0.27; molybdenum 0.12 per cent. Hardness as annealed and cold drawn was 207 to 217 brinell. Average tensile properties of standard 0.5-inch test bars were 94,300 pounds per square inch yield point; 107,400 pounds per square inch tensile strength; 17.0 per cent elongation in 2 inches; 48 per cent reduction of area.

This steel had an ASTM austenitic grain size of 6 after holding for 8 hours at 1700 degrees Fahr. Machinability compared with AISI C-1045. In the turning operation taking a cut of 0.0044-inch, time cycle was 1 minute 50 seconds, and compared with 1 minute 20 seconds for C-1045 at a surface speed of 70 feet per minute. In tapping, tool life was reported as being shorter for NE-9440.

Specified hardness of 26 to 32 rockwell C for the NE steel parts was obtained by quenching in oil from 1550 degrees Fahr. and tempering at 1000 degrees. Hardness range of a particular lot was 27 to 30 rockwell C.

Item 5: These bolts were not headed and threaded from bolt rounds of the same heat as used for Item 2. The ten-

(*Please turn to Page* 145)

Turnings getting in your hair?

then it's time to investigate the

AMERICAN RING TURNINGS CRUSHER

Chips, borings and turnings can be a terrific nuisance in any shop where automatic screw machines, lathes and planers, etc., pile up daily heaps of metal refuse. This waste byproduct is too valuable to throw away and too bulky to store. The problem is solved by the American Ring Turnings Crusher. This crusher utilizes the famous rolling ring principle of crushing, quickly and economically reducing bulky turnings of low or high carbon steel, alloy steel or brass into "Chips". American Ring Turning Crushers are built in various sizes; we will study your requirements, and recommend the proper size crusher for your particular needs.

ORIGINATORS OF THE ROLLING RING CRUSHING PRINCIPLE

Rear View
Size No. 2400

AMERICAN PULVERIZER COMPANY
1539 MACKLIND AVE. ST. LOUIS, MISSOURI

Plating Makes Surface Plates Like New

A new method of salvaging worn surface plates at the same time providing a superior surface for inspection setups is reported by Lincoln Park Tool & Gage Co., 1719 Ferris avenue, Lincoln Park, Mich. It consists of reworking the plate, hard chromium plating it and then lapping it flat.

The hard chromium plating, it is said, produces a surface that is much longer wearing, one that is harder and smoother —ideal for precision instruments. Thus far the work is limited to plates no larger than 18 x 24 inches. The plates, however, are not manufactured by the company.

Straightening Heated Parts

(*Continued from Page* 114)

these things which the straightener must come to know intimately.

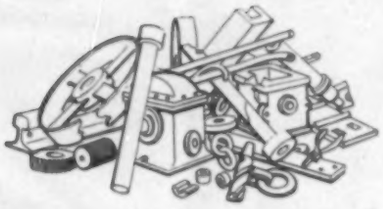
We soon learn that some steels straighten better with repeated light applications of pressure, whereas others require a steady pressure. Some steels have to be pressed "past center" to allow for "spring back". Other steels will take a "set" without "pushing by". Certain steels will continue to harden after being withdrawn from the quench, and others must be "chilled stiff". Tolerances in hardness limits may influence the method to be used in straightening.

Our problem then is to control cooling so as to produce the least amount of distortion, and then apply pressure to bring the part back to its original shape.

Quenching parts of uneven section so that the heavy section enters the quench first will help to maintain shape. Allowing some tools, such as high speed, to cool in air until the heat has dropped several hundred degrees before the oil quench will help reduce the drastic effect of the quench and will not appreciably affect hardness. Such procedures, however, do not guarantee a straight tool.

Straightening During Quench: The first possibility to examine is straightening during the quench. Air hardening steels in the shape of rods not too large in diameter can often be rolled between two flat heavy plates. This can be done by hand by moving the top plate back and forth while the round rod is cooling. Such steels as stainless, high carbon, high chromium and high speed also fall into this class. Reamers, broaches and similar parts having flutes or teeth are some times placed in a chuck vertically and lowered into an oil bath while spinning, or spun in air. Machines have been built having motor-driven rollers between which the round is placed and lowered into the quench-

THERE MAY BE A BATTLESHIP IN YOUR PLANT



EQUALS

WE NEED YOUR SCRAP METAL

Believe it or not, there is a shortage of scrap metal in yards at the mills. The shortage is so serious that unless every pound of scrap is salvaged the steel mills may be forced to slow down.

Such a thing must not happen here.

The steel industry is faced with the necessity of digging up millions of *extra* tons of scrap metal to complete the 1943 steel requirements of ninety million tons. This extra scrap tonnage must come from plants, shops, garages, farms, and homes. It's up to every loyal American to cooperate.

Go over your plant carefully and dig up all the scrap metal you can find. Post notices on bulletin boards telling your employes about the scrap salvaging campaign. The mills need every pound of scrap they can get. Don't overlook any possibility—every pound counts. The urgency cannot be overemphasized.

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY
DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE CLORE IRON ROOFING & CORRUGATING CO.

ing medium. This device is used with many oil hardening alloy steels.

Steels which are alloyed so that they harden all the way through can generally be removed from the quench at temperatures of 400 to 500 degrees Fahr. and immediately put under the press for straightening without any noticeable drop in hardness. These may include the SAE alloys (other than the straight carbon series), the oil-hardening tool steels, high-carbon high-chromium, stainless and high speed. When removed hot from the quench, these steels will be in a semi-hardened state and we must remember, while applying pressure, that hardening continues as the temperature lowers.

Next item of importance is manipulation of the press. The straightening press enables us to support the part at two points and to then apply pressure between those points to straighten the part. It is here that the aforementioned "feel of the press" becomes so vitally important. After determining the high spot or side by revolving the part in centers or V-blocks, pressure is applied to the high side with care. Various results can be obtained by changing the distance between the supporting blocks and the width of the point of pressure. Teeth and sharp corners can be protected by using blocks of copper for support and pressure.

If the warp is in a general long sweep, the supports may be spread fairly wide and a wide point of pressure may be used; i.e. a short block several inches long rather than a V-anvil.

When relatively short areas are warped more than the average of the full length, the distance between the supporting blocks can be shortened and "kinks" taken out first. Often the overall straightness will be found to be correct after the short high spots are removed. If a long warp persists, the blocks can be spread to take care of that. Generally, with this method of straightening it is necessary to push the work "by" or past center to take the required set.

Temperature of the piece can be pretty well gaged during straightening by touching with the hand, or by the time honored application of spit. A newer method is the use of a surface pyrometer or chemical pellets which melt at specified temperature ranges. The amount of pressure must be decreased as the temperature drops. By the time the tool can be handled with the bare hands, extreme caution must be observed as the tool is becoming fully hardened and very likely will snap unless pressure is carefully regulated.

For instance, if we have a reamer with a heavy shank and a light reamer section, it is best to take each part separately, finishing up with the stepped-down portion unless the indicator shows warp to be in the stepped-down section alone. If the tool is still quite hot when straightness tolerances have been reached, it can be set aside for a while but should be checked occasionally while cooling, as it may have a tendency to resume its original warped shape. If a change is noticed, the part can be replaced under the press and restraightened.

When straightening flat pieces on a block, it is often advisable to shim up the edges so that the part can be pressed slightly "by" in the center portion without the danger of going so far as to cause breakage.

To summarize then, the heat treater's first problem is to support the work properly in the furnace so that a minimum of distortion occurs in heating . . . then to control cooling for the same purpose . . . and finally, if the part has distorted in spite of all precautions, to select the straightening method best suited for the steel, type of part and temperature at which it is being straightened.

Specify Scaife

Scaife Tanks, Cylinders and Pressure Vessels for gases, air and water are designed, built and tested with full knowledge of the responsibility placed upon them by manufacturers and users today.

Designs are based upon years of experience with air receivers and pressure vessels of all types. They are built to required codes of construction by experienced craftsmen, employing modern manufacturing methods and equipment. Rigid tests and inspections check every step of manufacture.

SCAIFE COMPANY

Helpful Literature

1. Production Tools

Apex Machine & Tool Co.—32-page illustrated catalog No. 14 is descriptive of line of specialized tools for drilling, tapping, reaming, boring, stud and nut setting, screw driving and similar operations. Also covered are universal joints for aircraft and all angular drives.

2. Power Transformers

Allis-Chalmers Manufacturing Co.—19-page illustrated bulletin No. B-6186 describes power and distribution transformers and other electrical distribution equipment important in maintaining efficient flow of power to vital war industries. Important wartime considerations, such as use of welded construction and standardization of design to save materials in manufacturing and to provide advantages of interchangeability in installation, are discussed.

3. Manganese Steel

American Brake Shoe & Foundry Co., American Manganese Steel division—48-page illustrated bulletin No. 1142-SM discusses place of manganese steel in steel industry. Booklet is divided into sections covering use of this alloy in blast furnace department, coke plant, rolling mill and foundry. Twenty-five questions and answers summarize its characteristics and properties.

4. Colloidal Graphite

Acheson Colloids Corp.—4-page illustrated bulletin No. 422-AZ covers use of "dag" colloidal graphite as parting compound. Booklet explains its application to aviation and deep sea diving equipment, and its use in glass industry, in foundry and in rubber industry. General directions for use are outlined.

5. Seamless Tubes

Babcock & Wilcox Tube Co.—25-page illustrated bulletin No. T-319 covers B & W seamless tubes. Brief history of company is sketched. General procedure of seamless process of tube manufacture is outlined. Installation and application of various kinds of seamless tubes are described and shown. Table lists condensed technical data on high temperature steel of which tubes and pipe are made.

6. Selenium Rectifiers

Benwood Linze Co.—4-page illustrated bulletin No. R-40 contains general information on selenium rectifiers, including their assembly, plate sizes, efficiency, input voltage, stability, cooling and regulation. Information blanks are included which may be filled out and submitted to company for recommendations on proper rectifier for specific application.

7. Heat Exchangers

Brown Fintube Co.—4 page illustrated bulletin No. 431 is descriptive of six standard types of "Fintube" heat exchangers which meet wide range of heating, cooling and condensing needs. Fins are resistance welded and integrally bonded to tubes and are particularly adaptable for services where transfers between liquid or gas, or between materials of different temperatures are desired.

8. Electric Lift Truck

Easton Car & Construction Co.—4-page illustrated bulletin No. 162 is descriptive of type TLC-6 electric "Tier-Lift" truck built in several capacities for use in both low and high tiering of loads. Main power unit consists of motor mounted horizontally on axle housing resting in accurately machined saddle. Reducing mechanism is of double reduction spur and worm type. Specifications are listed and typical applications are shown.

9. Machine Tools

The Ohio Machine Tool Co.—16-page illustrated bulletin No. 300 describes "Ohio Dreadnaught" precision horizontal boring, drilling and milling machines of both table and floor types. Bulletin highlights such features as nitrided spindle, anti-friction bearings, automatic lubrication, built-in electrical power rapid traverse with push button control and unit construction, providing accessibility to all units. Line drawings show construction.

10. Industrial Truck Care

Baker-Raulang Co.—4-page illustrated folder, "Industrial Truck Care Pays You Dividends", emphasizes importance of preventive maintenance of industrial trucks. Maintenance plan should provide good floor conditions, place truck under supervision of competent mechanic for thorough weekly inspections, insist on regular lubrications and keep complete log sheet or record on each industrial truck. Parts to be included in weekly, monthly and semi-annual checkup are listed.

11. Speed Reducers

Janette Manufacturing Co.—99-page illustrated bulletin No. 22-37 describes "Janette" speed reducers in sizes of 1/50 to 10 horsepower and of speeds from 0.08 to 1140 revolutions per minute. Ratios of reduction are constant and positive. Speed reducers are used for practically all applications where standard motors could not be used, such as mixing machines, conveyors, filters and rheostats. Prices, specifications and operational data are given in detail.

12. Shop Truck

Buda Co.—4-page illustrated bulletin No. 1096-A describes Buda "Chore Boy" ½ ton industrial shop truck. Maximum speed is 15 miles per hour. Truck averages 35-38 miles per gallon of fuel. Complete turn may be made in 7-foot, 3-inch radius. Other features are electrically welded steel frame, spring cushioned seat, 16-inch pneumatic tires and internal expanding brake which is automatically applied when operator leaves seat.

13. Tool Salvage

Eutectic Welding Alloys Co.—16 x 20 inch illustrated poster, "How To Salvage Tools", gives complete procedure for salvaging tools vital to war program. In addition to general precautions, specific directions are outlined for salvaging broken broaches, milling cutters, under-sized flat broaches, form tools, drills broken in flutes, broken drill shanks; tipping tools with tungsten carbide and welding extension reamers from standard reamers.

14. Recirculating Furnaces

Despatch Oven Co.—16-page illustrated bulletin No. 81 is concerned with "Despatch" recirculating furnaces for all metal industries. Standard models are offered in batch, pot, car bottom and conveyor type furnaces. Heat dynamics of furnaces are explained. Several typical installations are illustrated.

15. Grinding Machines

Dumore Co. — 35-page illustrated catalog No. 42 explains construction and operation of "Dumore" precision grinders. Line drawings, typical installations and specifications are shown for various models. Accessories such as belts, oils, repair parts and wheels are also included. Catalog contains both product and alphabetical indexes.

16. Horn Presses

E. W. Bliss Co.—20-page illustrated catalog No. 6 is entitled, "Bliss-Toledo-Consolidated Horn Presses." Dimensions and specifications are given on standard and heavy pattern adjustable bed presses. Direct and single geared types are covered.

17. Indicating Potentiometer

Foxboro Co.—4-page illustrated bulletin No. A303 describes portable potentiometer indicators for testing and standardizing service instruments and thermocouples. Features of design are welded aluminum case, open and legible temperature scales, vernier dial knob, cold junction compensator, vernier type rheostat, rotary type switches and large binding post terminals.

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18. Tool Steels

Allegheny Ludlum Steel Corp.—28-page illustrated bulletin, "Elementary Discussion of Tools Steels," is written as training aid for those engaged in metal working industry. Data and instruction are included on all types of tool steels, covering available forms, characteristics, heat treatment, handling, applications and recommended types.

19. Bearing Regrinding

Ahlberg Bearing Co. — 16-page illustrated bulletin discusses reconditioning of industrial and automotive type ball bearings. Manufacturing procedure in renewing worn ball bearings is explained. Inner and outer races are reground and reconditioned. Bearing is assembled with new balls and retainers.

20. Safety Equipment

Boyer-Campbell Co. — 184-page illustrated catalog No. 50 describes and gives specifications on complete line of industrial safety equipment. All types of products for protection of workers from hazards encountered in industry and for maintaining safety program are covered. Service is offered in developing accident prevention program.

21. Hydraulic Presses

Baldwin Southwark division, Baldwin Locomotive Works—32-page illustrated bulletin No. 160 is descriptive of "Southwark" self-contained hydraulic presses for high speed production and accurate finish of metal stampings and formed metal parts. Standard and special models for all types of operations are covered.

22. Pneumatic Equipment

Allen Billmyre Corp. — 12-page illustrated booklet No. I-100 contains data on air blowers, exhausters, gas boosters and industrial vacuum cleaning systems. Bulletin describes many types of turbo and rotary blowers, as well as stationary and portable vacuum cleaners. Specifications and applications are given.

23. Identification Badges

St. Louis Button Co. — 16-page illustrated folder No. 9 covers employe badges, buttons and identification pass cases. Directions for ordering are outlined. Specifications, numbering, prices and priority required are listed for each type of identification device. Particular attention is directed to transparent plastic card cases and badges.

24. Cutter Grinder

Berco Manufacturing Co.—4-page illustrated bulletin on "Hilco" universal cutter grinder shows design and operation of this machine which may be used with universal index dividing head or with flat bed attachment. Typical set-ups for grinding slitting saw, shell end mill, double angular cutter, spiral end mill, tapered reamer and other cutters are pictured.

25. Pneumatic Tools

Cleveland Pneumatic Tool Co.—120-page illustrated catalog on "Cleco Pneumatic Tools" is compilation of bulletins covering chippers, riveters, sand rammers, drills, grinders, valves, couplings and other accessories related to pneumatic tools and their applications in industry.

26. Machine Screw Nuts

Central Screw Co.—4-page illustrated bulletin, "Two Heads are Better," points out how double chamfered nuts increase production in assembly of aircraft, communications, marine and ordnance equipment. Both faces of these nuts are identical so that it is impossible to install them upside down.

27. Metal Hose

American Metal Hose branch, American Brass Co.—12-page illustrated bulletin No. A-48 contains aeronautical engineering data on products of this company which are designed for use by aircraft industry. Specifications are given on various types of metal hose, fittings and conduit assemblies.

28. Tool Conservation

Henry Disston & Sons, Inc.—Six "Conservation Control" cards Nos. 40 to 45 deal with how to obtain better results in working steel. Failure, cause and correction, as well as working instructions on tungsten-molybdenum, carbon-vanadium, high-carbon high-chromium, oil hardening, chrome tungsten and nickel chrome steels are outlined.

29. Centering Device

Center Scope Instrument Co.—16-page illustrated bulletin No. 301 gives complete details of "Center Scope" optical centering and locating instrument which can be easily and quickly used on any machine to center work reference lines to spindle axis. Typical applications of this device on all types of machining and assembling operations are shown.

30. Bending Presses

Cleveland Crane & Engineering Co.—28-page illustrated catalog No. 2002-B covers engineering design, construction, operation, performance and maintenance of "Steelweld" bending presses. Features which insure accuracy and safety are shown and described. Bending, forming, blanking and multiple punching operations are easily performed with these machines.

31. Welding Electrodes

Champion Rivet Co. — 68-page illustrated "Welding Electrode" catalog discusses electric arc welding and its relationship to making of steel. Manufacture of coated welding electrodes for all types of applications is explained. Engineering data includes physical and metallurgical facts about shielded arc welding, and handy reference information related to arc welding.

32. Metal Cutting Lubrication

Cities Service Oil Co. — 32-page illustrated manual, "Metal Cutting Lubrication," contains engineering data and operating information on use of various types of lubricants and fluids in many classes of metal working operations. Booklet is designed to give user an understanding of action of these fluids in machining operations, their composition and application.

33. Production Machines

Davis & Thompson Co.—16-page illustrated bulletin, "Victory Production," briefly describes various production machines which are engineered for making airplane engine parts, shell and bomb fuses, machine gun barrels, tank track links and other war parts. Milling, planing, drilling and threading machines are some of types covered.

34. Steel Flooring

Dravo Corp.—20-page illustrated catalog No. 1140 is devoted to design, construction, engineering and applications of "Tri-Lok" open steel flooring, concrete armoring, safety steps and bridge flooring. Available patterns, installation, maintenance and other data are given on these materials.

35. Pipe Fabrication

A. M. Byers Co.—20-page illustrated engineering service bulletin, "The Bending and Flanging of Wrought Iron Pipe," discusses theory and principle of bending, bending practice essentials, cold bending, hot bending and related subjects. Tables present data on standard and extra heavy wrought iron pipe ranging from ⅛ to 12 inches in diameter.

36. Steam Drop Hammer

Chambersburg Engineering Co. — 16-pages illustrated maintenance bulletin deals with maintenance, lubrication, installation and operation of model "E" steam drop hammer. Maintenance schedule lists parts, frequency of inspection required and instructions on how to proceed. Detailed drawing shows construction and all parts.

37. Jig Borer

Bryant Machinery & Engineering Co. — 24-page illustrated catalog No. 300 describes the "Cleereman" jig borer which is designed to produce jigs and fixtures to highest degree of precision. Accurate work is performed for manufacture of tools, dies, gages and parts in limited production runs.

38. Industrial Lighting

Curtis Lighting, Inc.—12-page illustrated bulletin No. 2130 gives specifications and brief descriptions of fluorescent, incandescent and mercury vapor lighting units for general factory and inspection areas in all types of industries. Illumination data to aid in selection of units for any specific application need is included.

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Cowl Ventilators

(*Continued from Page 106*)

stroke and power that make this a noteworthy machine.

Sheet steel may be drawn to a maximum depth of 42 inches.

Operating under an oil pressure of 2000 pounds, three large hydraulic pistons force the top platen down with a force of 1100 tons. The center cylinder, constructed of cast steel with 3½-inch walls, has an inside diameter of 26 inches. The outer rolled-steel cylinders measure 22 inches.

Three hydraulic pumps are employed to move the top platen—two for the downstroke, one for the pullback. All pumps run when the press operates. By means of a bank of pushbuttons, the downstroke speed may be varied at will through four stages. Normally, the stroke starts down at the rate of 5 feet per minute, diminishing to 3 feet, then 2 feet, and finally to 2 inches a minute at the end of the thrust. Pullback carries the die upwards at 10 feet a minute.

Press Features Smooth Control

As a rule, air cushion pads supporting the lower platen of such a press are controlled by one main regulator valve. Here, however, the male die rests on a heavy steel bed, and the drawing rings are supported by eight air cushions, each of which may be separately regulated at pressures ranging from zero to 150 pounds. By this means, it becomes unnecessary to shim between the drawing rings in drawing in the throat, a procedure ordinarily practiced. In short, by changing pressures at various points around the perimeter of the bed, stresses and strains may be so governed that the sheet being drawn will not crack and tear. Compressed air is delivered through six control valves from six separate steel storage tanks located immediately below the press. Thus six separate air pressures are available for smooth sure action of the air cushion pads.

Weight and design combine to give the structure great strength. The base alone weighs 25 tons, and the top 9 tons. Three hundred and ninety tons of concrete support the press, this great quantity being poured both to withstand the great force exerted and to dampen the vibration. Fact is, little impact is felt at the site iself, due to the squeezing action employed. Six-foot concrete walls surround the pit in which the press rests, helping make the structure earthquake-proof. Added strength is obtained through the use of rolled and welded cylinders and pistons.

Although fabrication of ships' ventilators represents an unusual departure for a firm which, during its 44 years of manufacturing experience, has been turning out showcases, refrigerator equipment and similar goods, President Karl Weber declares he's ready to tackle any job his engineers think they can deliver. Already the Marine Department is busy on confidential projects for the Army and Navy. It is expected the big press will continue stamping out cowls of various sizes "for the duration", with an occasional odd job squeezed in to help keep the nation's bridge of ships moving to far ports.

Ribbon Type Steel Wool Is "Jack of all Trades"

Steel wool in continuous ribbon form is now being made by American Steel Wool Mfg. Co., Long Island City, N. Y., in order to meet varied demands created by war plants.

Referred to as type A, the wool is produced in ribbons 4 inches wide rolled on spools weighing 12½ pounds each.

The wool, in this form, according to the compa y, lends itself to many uses. In the aircraft industry, it is widely used in machining operations.

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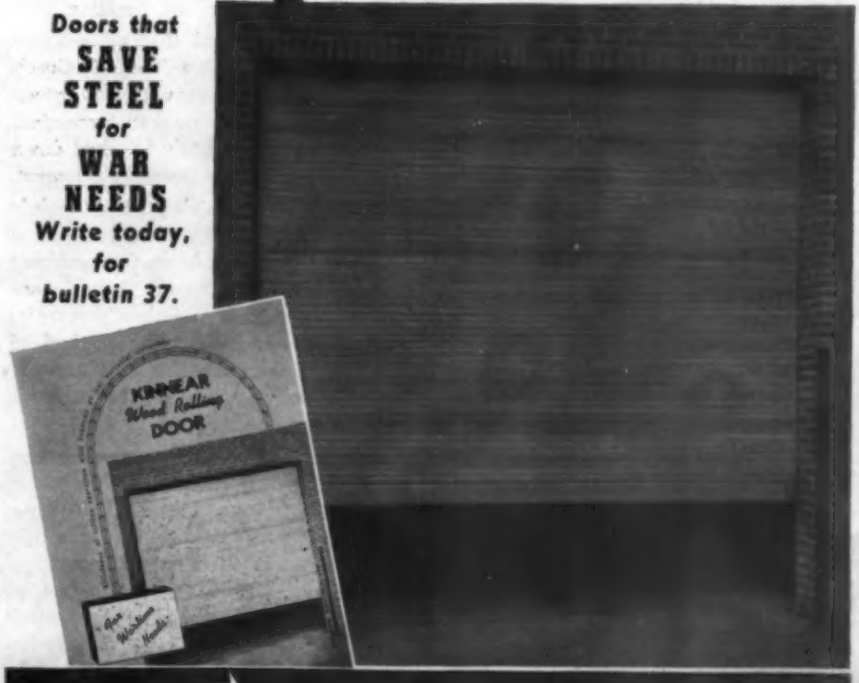
Smooth, quick, easy operation . . . a rugged interlapping-slat curtain that coils compactly out of the way and out of reach of damage . . . maximum savings in floor, wall and ceiling space . . . full protection against wind and weather . . . choice of motor or manual control . . . neat, modern appearance! The Kinnear WOOD Rolling Door duplicates these famous advantages of the Kinnear Steel-Rolling Door *with maximum savings in war-vital steel!* Any size, for new construction or replacements. The Kinnear Manufacturing Co., 1780-1800 Fields Ave., Columbus, Ohio



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Mass producing deep-drawn stainless steel parts, intricate channel sections or stainless tubing with sharp bends means high pressures and high temperatures that may cause lubrication failure and rapid die wear. Oakite "know-how" has the answer to these and similar problems. Here, for example, are two typical operations . . . common enough, yet extremely important when working with stainless steel.

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To do an effective job on stainless steel, a drawing compound must stand up under critical working conditions . . must also be easily removed. Oakite Drawing and Stamping Compounds are satisfactorily meeting these requirements on a wide range of stainless steel lubricating operations.

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Before annealing operations, drawn parts should be thoroughly degreased and descaled. Specialized Oakite materials may be effectively used to remove heavy, tenacious drawing compounds, machining oils, shop dirt, annealing scale, etc.

A NEW Special Service Report gives helpful, factual data on working with stainless steel. Write for your copy TODAY!

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MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

Boxing for Export

(*Continued from Page* 108)

the space allotted for vehicle boxing increased more than three times from 1937 to the spring of 1942. Since our entry into the war, export boxing lines have been completely rearranged—with items of equipment relocated and great quantities of new equipment added. The advantages obtained are many. One important result is that the chassis boxing schedule has been increased 233 per cent.

In 1937, heavy-duty export trucks were boxed by the single-unit method of pack. Government military contracts at that time also specified the single unit setup. This was changed early in 1942 to a 2-unit pack, which, in turn, required many changes in the entire export operation.

So great have the export boxing demands for military vehicles been that the services of the Pontiac Motor Division's boxing lines are also required to meet the established schedules, as well as the boxing facilities of Chevrolet at St. Louis, Mo. At Pontiac's plant, a continuous chassis tear-down-and-boxing line turns near its end to deliver directly to depressed railroad tracks for rail shipping. Distributor or by-lines are provided at right angles for bodies, cabs, axles, fuel tanks, and so on, when necessary. Each line is provided with its individual spray booth. The by-lines also lead directly to depressed railroad tracks for direct loading into cars. The entire operation is housed in one building.

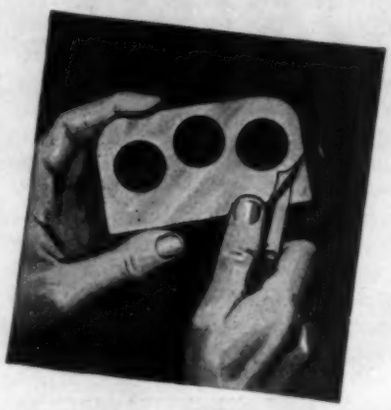
It should be noted that all military vehicles built by Yellow Truck & Coach are first completely manufactured, given road tests and government inspection. Then they are completely knocked down and disassembled for overseas shipment.

As the military-vehicle boxing schedule at Yellow Truck & Coach expanded, so did all of the various items and problems connected with it. Outside storage space had to be obtained. Lumber inventories reached a new high. The method of handling lumber was changed from the bunk-and-dolly system to the package-and-crane method

A large bank of lumber was required —not only because of the heavy boxing schedule but because seasonal flood periods in the South interrupt the even flow of lumber. In the first six months of 1942, some 23,500,000 board feet of lumber were consumed by the export vehicle line. If it were not for the important saving which has been accomplished by going to the 2-unit pack from the old original 1-unit setup, this consumption figure would be much larger.

The task facing the export department

save



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is tremendous for it must see to it that all the parts for a vehicle are sent to the right place at the right time. The personnel of this department has grown by leaps and bounds. The paper work involved and the records which must be kept in great detail are enormous.

As previously mentioned, export boxing involves planning for ease of reassembly and for conserving shipping space. In addition to the various methods of packing to meet prevailing conditions, detail manuals covering reassembling operations are required by the government. To date, fourteen separate manuals have been issued. The first manual was entirely original with the company, as nothing of a similar nature had been in use prior to this new export program. These manuals are prepared on the basis that reassembly might be required under the most unfavorable conditions and with the minimum of equipment.

Proper vehicle boxing thus is a vital part of the war production program at Yellow Truck & Coach. With the tremendous volume, it is now possible to have trained and experienced workmen for each of the various shifts. Definite schedules now make it possible to provide for a continuous or uninterrupted operation—with adequate space, equipment and the necessary manpower to accomplish the job under the conditions imposed and within the time limits established.

But the preparation of the completed military vehicle for shipment overseas is only part of the job. The shipment of replacement parts for the thousands of military units which have already been sent to the fighting forces on the many battlefronts is another important and gigantic job. These military requirements have long ago overshadowed the volume and detail of normal consumer demand. This task has also presented new and complex problems.

While parts sales in dollar to the federal government in normal times could be expressed in six figures, you could add more than $11,000,000 to the best previous year's total and you still would not have the dollar volume of parts for the year of 1941—and America then had not even entered the war. This sharp upturn in 1941 was attributable to War Department activities as a result of hostilities in Europe and the constantly increasing threat of world-wide war involving America.

Replacement parts also were required to follow vehicles shipped abroad under lend-lease. Immediately after our entry into the war, a basic change took place which had a material influence on the handling of government parts orders at Yellow Truck & Coach. This centered around the intent to carry the war to the aggressor rather than the determination to built strictly a defensive protection here at home. This placed new emphasis and added importance on the matter of replacement parts supply. It meant supplying parts boxed for export shipment and scheduled for shipment concurrently with new vehicle movement.

Prior to the war, parts orders for the government were handled on a "ship as received" basis. In January, 1942, overseas shipments were changed to sets or "lots", and no boxes could be forwarded until each and every last piece was available. A "lot" is sufficient material to service 100 motor trucks for a period of one year. Handling the parts in this manner required great additional floor space for the segregation and make-ready of the parts for shipment. And huge though the task had become, officials at Yellow Truck & Coach had no idea of the proportions it was to assume until a letter of intent was received from the War Department early in January and the order for parts required for the year of 1942 was nearly four times the dollar volume of the previous rec-

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ord-breaking year—1941.

Some idea of the magnitude of the job is indicated by the fact that the boxes constituting a "lot" range in weight from 22 pounds to 806 pounds. In size the boxes range from 0.75 to 23 cubic feet. Boxing requires 93 different size cases.

Parts are boxed on power-driven lines. Additional lines are used to unitize material or pack small parts into cartons. All small parts on these subassembly boxing lines are oiled and processed for protection against the weather. Boxing requirements for the armed forces are strict in this respect. Shipments must be protectetd against varying climatic conditions throughout the world. At the time the parts are being boxed, no one at Yellow Truck & Coach has any idea of the ultimate destination.

Several methods of processing parts for protection are used, depending upon the part involved. These include oil paint, asphalt waterproofing, oil and wax dips, greases, and some parts are even wrapped in specially treated cloths. An entire department is at work constantly in an effort to improve these protective measures to assure delivery in good condition.

As this is being written, there are 14 cases of truck parts being tested at sea to determine the best protection for future shipments. These parts are wrapped and protected differently. Each box is lined with a different waterproof material.

Each carton fixed within each case has been treated in a different manner. Some of the parts are sealed in waxed paper or cellophane; others in specially treated paper; others in waterproof cloth. Some parts are coated with different preparations, wrapped and then dipped in wax and sealed in various types of containers. These cases will be shipped back to Pontiac for study at various intervals. The degree of moisture absorption of the various containers will be carefully weighed and compared. The parts themselves will be examined. Out of it all will develop new and better methods of packing and protecting the parts on their long journey to foreign battlefronts. This work goes on constantly and has been going on for months.

Weight Important Factor

It has been determined that the ideal group weight of a box of parts is around 125 pounds. This is important in dealing with the extreme possibilities that might be encountered in unloading this type of material at its point of destination. From a practical standpoint, this weight cannot be exactly maintained in such cases as motors or axles, etc. On the other side of the scale, a practical minimum has been established at 70 pounds. With the exception of extremely small parts, such as rivets, washers, etc., it is deemed advisable that every piece be in its own individual container, properly identified on six different sides of the box. For ease of handling, the containers must be incorporated in a large container, known as a tray pack.

A complete list of the contents of each large container is imprinted on the outside for ready identification. Each must be equipped with a waterproof liner and completely sealed. A complete box "directory" is prepared, showing the list of parts in each large case and the content of each box is indicated both numerically and alphabetically. This list may not be changed once export packing is started.

So great has this boxing program grown at Yellow Truck & Coach that an entire new building was rushed to completion to take care of it. All parts boxing is done by the company within its own factories. Space has been secured at the Michigan State Fair Grounds for storage of completed boxes. The boxes of parts are delivered to the Fair Grounds by truck and by rail.

Work goes on night and day to keep this tremendous boxing program on schedule. Yes, it is on schedule.

Springing surprises is as much our business as perfecting the spring of your needs . . . Both made possible through SCIENTECH design.
LEE SPRING COMPANY, INC.
30 MAIN STREET
BROOKLYN, N. Y.
LEE-BUILT TRADE MARK SPRINGS

New Process

(*Concluded from Page* 120)

needed for cutting gears has been difficult to obtain due to the demand occasioned by the war effort. Thus the new process already has expedited war production by eliminating delays incident to obtaining critical machining equipment, in addition to saving time by eliminating operations that would have been involved.

Details of the development which also saves half the steel ordinarily needed per gear will be revealed at the national meeting.

In the accompanying illustration R. R. Nathan, chairman of WPB planning committee, right, is discussing the process with Willard F. Rockwell, board chairman of Timken Axle Co., where the process was developed. Mr. Nathan is holding one of the new gears already in production for Army vehicles, and the small billet of steel from which the gear is produced to finished size in giant forging presses. Mr. Rockwell is holding the same type of gear and the large blank from which such gears were previously machined.

NE Alloy Steels

(*Concluded from Page* 136)

sile properties of the ½-inch NC cut thread bolts after quenching in oil from 1550 degrees Fahr. and tempering at 1000 degrees Fahr. were:

	*Yield Point P. S. I.	*Tensile Strength P. S. I.
Min.	133,400	149,200
Max.	141,300	161,600
Avg.	136,890	154,900

Elongation in actual length 6 35/64 inches	Hardness (43 readings on Rockwell C 10 bolts)
Min. 3/16	31
Max. 3/16	34
Avg. 3/16	32

*Calculated from an area of 0.1410-inch obtained from a diameter half way between the basic minor and pitch diameter of the thread.

The specified hardness of these bolts is 26 to 36 rockwell C. Minimum tensile strength: Yield point, 125,000 pounds per square inch; tensile strength 140,000 pounds per square inch; elongation, ⅛-inch.

Item 9: This NE-9440 heat analyzed: Carbon 0.41 per cent; manganese 1.16; silicon 0.49; nickel 0.26; chromium 0.34; molybdenum 0.12 per cent. Hardness of the annealed and cold drawn material was 196 to 207 brinell. Average tensile properties of the cold drawn material obtained from standard 0.5-inch test bars were 98,800 pounds per square inch yield point; 107,000 pounds per square inch tensile strength; 16.8 per cent elongation in 2 inches; 43.8 per cent reduction of area.

The austenitic grain size was ASTM 6 after holding for 8 hours at 1700 degrees Fahr. Laboratory tests of specimens prior to release of the material for heat treatment consisting of standard end quench tests and heat treatment of 0.525-inch tensile bars give the following information:

End hardness of the hardenability test bar ranged from 57 to 60 rockwell C. A hardness of 50 rockwell C was maintained at a distance of 0.32-inch from the end, of 45 rockwell C 0.41-inch from the end, and 40 rockwell C 0.52-inch from the end.

Average tensile properties of 0.525-inch test bars heat treated by quenching from 1550 degrees Fahr. in oil and tempering at 900 degrees Fahr. were 166,300 pounds per square inch yield point; 177,100 pounds per square inch tensile strength; 14.0 per cent elongation in 2 inches; 52.8 per cent reduction of area at hardness of 37 rockwell C.

Opportunity to Stretch Compressor Capacity

An inspection of your air operated equipment may show many places where reduced pressure will mean better performance, in addition to more efficient use of available air compressor capacity. With Hannifin pressure regulating valves, working pressure can be quickly and easily adjusted to the needs of each machine, and to different operations on the same machine.

Exclusive piston-type design provides large volumetric capacity and sensitive, accurate control of working pressures. Adjustment can be made over the entire working range from 150 lbs. down to provide any reduced operating pressure needed.

Three standard sizes, ⅜, ½, and ¾ inch, for use on initial pressures up to 150 lbs. Write for Bulletin 56-S.

HANNIFIN MANUFACTURING COMPANY
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Pressure Regulating VALVES

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Laid Steel—*hi-speed and carbon*
Rotary Shears and Slitters

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Steel Industry Adopting CMP With Little Friction

Understanding of plan becomes clearer. . . Deliveries hold steady. . . Scrap position regarded as safe. . . All production statistics reflect high rate of war effort

DEMAND
Heavy for war purposes.

PRODUCTION
Down ½-point to 99 per cent.

PRICES
Some slight shading.

VOLUME of Controlled Materials Plan orders continues to grow, with increasing emphasis on validation of old contracts.

While experience differs, some sellers find most tonnage placed under CMP by manufacturers is for delivery late in second quarter, with the exception of sheets, where a large portion is for April and early May. Deliveries have not been greatly dislocated by the preference which CMP orders are given.

Many orders under CMP are being received without formal approval and serial numbers. These cause a problem as to disposition. Some mills are putting them through regular order routine but are not placing them on rolling schedules, pending validation. In general, understanding of the new plan is improving but some confusion continues, especially in Class B products. In some cases mills have more tonnage covered by these orders than can be rolled during April.

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Deliveries remain at about the same position as for the past few weeks, hot-rolled sheets generally available at seven to eight weeks, with some producers able to promise about six weeks. Cold-rolled are slightly more extended, at seven to nine weeks, galvanized about the same. Structural shapes can be had in six to eight weeks, though this could be better were sufficient steel available to mills for this purpose. Small volume of shapes causes delay in accumulating sufficient tonnage for a rolling.

Steelmaking operations last week declined ½-point to 99 per cent after holding at 99½ per cent for three weeks. The limiting factor continues necessity for open-hearth furnace repairs under the sustained high rate of production. Advance of 1 point to 100 per cent at Pittsburgh placed that district at the highest point since Aug. 30, 1941, when the same level was reached. Buffalo dropped 2½ points to 90½ per cent, Cincinnati 6 points to 85 and St. Louis 3 points to 88 per cent. Chicago maintained its rate of 101 per cent, Youngstown 97, Wheeling 84½, eastern Pennsylvania 95, Birmingham 100, Cleveland 92½, Detroit 91 and New England 95.

A survey of the steel and iron scrap situation by the American Iron and Steel Institute leads that body to look at this year's prospects hopefully. Material in steel company yards Jan. 1 was 2,000,000 tons greater than at March 31 and unprocessed scrap in dealers' yards promises a continuing supply as it comes out gradually. Unusual cold and snow recently limited collection and preparation, already slowed by lack of labor. Efforts to correct the latter condition have not been successful. Progress is being made in disposing of the overload of turnings, Steel Division of WPB reporting allocation of 30 per cent more than were handled in January.

An indication of the high rate of steel production is found in the report of finished steel shipments by the United States Steel Corp. in February, 1,691,592 net tons, exceeding those of January, a longer month, and establishing a new high for February. January and February total was the highest in the Corporation's history for the first two months of a year.

Intensified demand for steel plates to supply the enlarged shipbuilding program and other war industries has resulted in new production records. In February the average daily rate was the highest in history, though the short month precluded a tonnage record. With March three days longer it seems probable all prior output records will go by the board.

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Steel ingot production in February was at the second highest rate in the history of the industry, measured by average weekly output. Except that it is a short month it would have been second in total tonnage. The industry made an average of 1,702,970 net tons weekly, exceeded only in October, 1942, when output was 1,712,159 tons. The industry operated at 98.3 per cent of capacity, compared with 96.6 per cent in January.

Shortage is developing in cutting tools for metalworking machinery and keeping the industry's equipment supplied is a problem, especially in view of the 500,000 new machines put in service during the past two years. Deliveries of some tools are as much as 10 to 12 months delayed in the case of important manufacturers.

Composite average prices of steel and iron products are steady at ceilings of Office of Price Administration, finished steel at $56.73, semifinished steel at $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Mar. 13	Mar. 6	Feb. 27	One Month Ago Feb., 1943	Three Months Ago Dec., 1942	One Year Ago Mar., 1942	Five Years Ago Mar., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.92
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	13.40

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	March 13, 1943	Feb., 1943	Dec., 1942	Mar., 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.49	2.49	2.49	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.22	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55
Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to $\frac{5}{16}$-inch, Pittsburgh	2.00	2.00	2.00	2.00

Pig Iron	March 13, 1943	Feb., 1943	Dec., 1942	Mar., 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.39	25.39	25.39	25.365
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2X, del. Phila. (differ. av.)	26.265	26.265	26.265	26.24
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.54	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	140.65	125.39
Scrap				
Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke				
Connellsville, furnace, ovens	$6.50	$6.15	$6.00	$6.00
Connellsville, foundry, ovens	7.25	7.25	7.25	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $36, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c; Pac. ports, dock 2.50c; all rail 3.25c.
(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage.

base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)
Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.
Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.
Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.
Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Pheonixville, for export.)
Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c
Wire Products to the Trade:	
Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	.67
Do., 11 gage and heavier	.70
Barbed wire, 80-rod spool, col.	.70
Twisted barbless wire, col.	.70
Single loop bale ties, col.	.59
Fence posts, carloads, col.	.69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

	Butt Weld Steel Blk.	Steel Galv.		Iron Blk.	Iron Galv.
In.			In.		
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
⅝	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

	Lap Weld Steel Blk.	Steel Galv.		Iron Blk.	Iron Galv.
In.			In.		
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base. per lb.
18.00	4	1	-	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	‡‡18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.
Extras mean additions or deductions from base prices in effect April 16, 1941.
Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.
Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.
Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.
Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine	
⅛ x 6 and smaller	65½ off
Do., ¼ and ⅜ x 6-in. and shorter	63½ off
Do., ½ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off
Stove Bolts	

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Semifinished hex.	U.S.S.	S.A.E.
Nuts		
⅞-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws	
Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off
Square Head Set Screws	
Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens	
Connellsville, furnace	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	8.00
Wise county, furnace	7.00
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943. †$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	.....	.....	28.15
Birdsboro, Pa., del	25.00	24.50	26.00	25.50
Birmingham, base	‡20.38	‖19.00	.....	.....
Baltimore, del.	25.67	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	‡24.47	.....	.....	.....
Cincinnati, del.	24.30	22.92	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.24	.....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	‡24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	.....	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.75	26.26	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	26.05	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, ▲Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.54
(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00

Second Quality

Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00-28.00
Do., barge	25.00-28.00
No. 2 lump	25.00-28.00

(Prices effective Nov. 23, 1942)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36.

Electrolytic manganese: 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-96%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

Silico-manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; ton lots 6.30c; less-ton lots 6.55c; less 200-lb. lots 6.80c. Spot prices ¼-cent higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb. higher.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.36; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents per pound higher.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots 11.00c, less ton lots, 11.50c.

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	AISI hot bars 2300 series	AISI hot bars 3100 series
Boston	3.98[1]	3.85[1]	3.85[1]	5.66[1]	3.71[1]	4.06[1]	5.06[1]	5.11[14]	4.68[14]	4.13[21]	3.46	7.75[25]	6.05[25]
New York	3.84[1]	3.75[1]	3.76[1]	5.56[1]	3.58[1]	3.96[1]	3.96[1]	5.00[12]	4.60[1]	4.09[21]	3.51	7.60[25]	5.90[25]
Philadelphia	3.85[1]	3.55[1]	3.55[1]	5.25[1]	3.55[1]	3.95[1]	4.45[1]	4.90[18]	4.63[18]	4.06[21]	3.31	7.56[25]	5.86[25]
Baltimore (city)	3.85[1]	3.70[1]	3.70[1]	5.25[1]	3.50[1]	4.00[1]	4.35[1]	5.05[17]	5.00[20]	4.04[21]	....	....	....
Baltimore (country)	3.85[1]	3.70[1]	3.45[1]	5.25[1]	3.25[1]	4.00[1]	4.35[1]	4.75[17]	5.00[20]	4.04[21]	....	....	....
Washington, D. C.	3.95[1]	3.80[1]	3.80[1]	5.35[1]	3.60[1]	4.10[1]	4.45[1]	5.15[17]	5.10[20]	4.03[21]	....	....	....
Norfolk, Va.	4.00[1]	4.05[1]	4.05[1]	5.45[1]	3.85[1]	4.10[1]	4.10[1]	5.40[17]	4.50[24]	4.15[21]	....	....	....
Bethlehem, Pa.*	3.45[1]	....	....	....	....	....	....	....	....	....	....	....	....
Claymont, Del.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Coatesville, Pa.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Buffalo (city)	3.35[1]	3.40[1]	3.62[1]	5.25[1]	3.25[1]	3.82[1]	3.82[1]	4.75[15]	4.30[19]	3.75[21]	3.52	7.35[25]	5.65[25]
Buffalo (country)	3.25[1]	3.30[1]	3.62[1]	5.25[1]	3.15[1]	3.82[1]	3.82[1]	4.65[15]	4.20[19]	3.65[21]	....	....	....
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[15]	4.00[24]	3.65[21]	....	7.45[25]	5.75[25]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[15]	4.00[24]	3.65[21]	....	....	....
Cleveland (city)	3.25[1]	3.58[1]	3.40[1]	5.18[1]	3.35[1]	3.50[1]	3.50[1]	4.62[15]	4.03[24]	3.75[21]	3.20	7.55[25]	5.85[25]
Cleveland (country)	3.25[1]	3.58[1]	3.30[1]	5.18[1]	3.25[1]	3.50[1]	3.50[1]	4.62[15]	3.95[24]	3.65[21]	....	....	....
Detroit	3.43[1]	3.65[1]	3.60[1]	5.27[1]	3.43[1]	3.43[1]	3.68[1]	4.84[15]	4.30[24]	3.80[21]	3.40	7.67[25]	5.97[25]
Omaha (city)	4.10[1]	4.15[1]	4.15[1]	5.75[1]	3.85[1]	4.20[1]	4.20[1]	5.52[16]	4.77[24]	4.42[21]	....	....	....
Omaha (country)	4.00[1]	4.05[1]	4.05[1]	5.65[1]	3.75[1]	4.10[1]	4.10[1]	5.52[16]	4.77[24]	4.42[21]	....	....	....
Cincinnati	3.60[1]	3.68[1]	3.65[1]	5.28[1]	3.42[1]	3.67[1]	3.67[1]	4.92[16]	4.37[24]	4.00[21]	3.45	7.69[25]	5.99[25]
Youngstown, O.*	....	....	....	....	....	....	....	4.40[15]	....	....	....	....	....
Middletown, O.*	..	....	....	....	3.25[1]	3.50[1]	3.50[1]	4.40[15]	....	....	....	..	....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	4.85[15]	4.10[24]	3.75[21]	3.50	7.35[25]	5.65[25]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.75[15]	4.00[24]	3.65[21]	....	....	....
Milwaukee	3.63[1]	3.68[1]	3.68[1]	5.28[1]	3.38[1]	3.73[1]	3.73[1]	4.98[15]	4.23[24]	3.88[21]	3.54	7.33[25]	5.88[25]
St. Paul	3.75[1]	3.80[2]	3.80[2]	5.40[2]	3.50[2]	3.85[2]	3.85[2]	5.00[2]	4.35[2]	4.34[21]	3.83	7.70[25]	6.00[25]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[15]	4.24[24]	4.02[21]	3.61	7.72[25]	6.02[25]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[15]	4.25[24]	3.97[21]	....	....	....
Indianapolis (country)	3.55[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[15]	4.00[24]	3.97[21]	....	....	....
Memphis, Tenn.	3.90[5]	3.95[5]	3.95[5]	5.71[5]	3.85[5]	4.10[5]	4.10[5]	5.25[15]	4.66[24]	4.31[21]	....	....	....
Birmingham (city)	3.50[5]	3.55[5]	3.55[5]	5.83[5]	3.45[5]	3.70[5]	3.70[5]	4.75[15]	4.78[24]	4.43[21]	....	....	....
Birmingham (country)	3.40[5]	3.45[5]	3.45[5]	5.83[5]	3.35[5]	3.60[5]	3.60[5]	4.75[15]	4.78[24]	4.43[21]	..	....	....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[26]	4.95[19]	4.60[21]	5.00	....	....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[26]	4.95[19]	4.60[21]	....	....	....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.75[3]	4.30[3]	4.30[3]	5.25[26]	5.43[19]	4.50[23]	....	....	....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[15]	7.15[3]	5.70[22]	....	9.55[25]	8.55[25]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[15]	7.55[19]	5.55[22]	....	9.80[3]	8.80[3]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[15]	7.45[19]	5.45[22]	....	....	....
Tacoma	4.20[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.25[3]	5.45[3]	5.70[3]	6.63[24]	5.75[22]	....	....	....
Seattle (city)	4.20[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.35[3]	5.45[3]	5.70[3]	6.63[24]	5.75[22]	....	....	8.00[3]

*Basing point cities against which warehouses equalized freight as of April 16, 1941, and which must now be used in calculating lowest combination prices.

NOTE—All prices except cold-rolled strip and AISI hot-rolled bars fixed by Office of Price Administration in amendment No. 10 to Revised Price Schedule No. 49.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—800 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, any quantity is base.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash. (S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (f.o.b. Columbus, Mont.)	
48% 3:1	43.50

less $7 freight allowance

Manganese Ore

Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	96.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per G T	Electric furnace Bars per 100 lb.	Electric furnace Billets per G T
	Chemical Composition Limits, Per Cent									
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	....	....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	$.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.18-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9253	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	....	....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	....	....
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9587	.55-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c, per 100 lb., on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semifinished. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES — Low Phos. Grades: Billet, Bloom Forge Crops	Low Phos. Grades: Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate: 3 ft. and less	Heavy Structural, Plate: 2 ft. and less	Heavy Structural, Plate: 1 ft. and less	Foundry Steel: 2 ft. and less	Foundry Steel: 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails: 3 ft. and under	Scrap Rails: 2 ft. and under	Scrap Rails: 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.
Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.
Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: When shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the 'corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

Sheets, Strip . . .

Sheet & Strip Prices, Page 148

The past few days have seen a sharp increase in the number of sheet orders carrying CMP allotment numbers. Some sellers report that close to 10 per cent of their orders now carry such numbers and look for the ratio to increase substantially before the month is over.

As CMP orders swell, they look also for an increasing dislocation of present delivery schedules on tonnages carrying PRP ratings, although so far the effect has not been pronounced. However, sellers naturally are less definite in their delivery promises on such ratings.

While a diversion of opinion exists as to the sequence of preferences, one eastern seller sizes them up broadly as they apply to steel and other CMP producers, as follows: Non-integrated mill directives, another group of directives having to do with lend-lease and certain other uses, CMP, AAA and other priority ratings.

Inquiry is slightly heavier with shipments more extended with some producers, open capacity gradually narrowing for hot and cold-rolled as well as galvanized. Despite this tendency, however, 15 suppliers quoted on several thousand tons for the Navy, mostly mills. This tonnage will be widely distributed. Substantial demand is maintained for alloy flats for production of saws. Ash and garbage cans for the services are also pending, thousands of units required. On the whole, however, most sheet volume is needed for fluctuating war contracts with engineering details involved.

A contract to fabricate grating catwalks for 1050 Liberty ships has been placed by the Maritime Commission with the Irving Subway Grating Co., Long Island City, N. Y. A substantial tonnage of 1 x ⅛-inch hot-rolled strip will be required. The contract must be completed by September. The Irving company is also producing emergency airplane landing mats for the government.

Seven to eight weeks continues the general rule on hot-rolled sheet deliveries with some sellers able to promise six weeks. On cold-rolled sheets the spread is about seven to nine weeks, with galvanized about the same. A leading inquiry in the East involves 1600 tons of galvanized sheets for Army ammunition boxes, bids closed last week.

Plates . . .

Plate Prices, Page 149

Plate orders under CMP are more numerous but producers believe that most applications filed this month for May rolling will be under PRP, on 298 forms. It is expected these forms will be used to some extent for June rollings, after which all orders will be under CMP. Some sellers are receiving CMP orders on which priority ratings are still being given. They state that these ratings are unnecessary and have no bearing on scheduling. However, the date of the order is regarded as a factor and significantly buyers are not disposed to cancel tonnage in changing to the new system.

Plates wider than 72 inches are going mainly to shipyards. About 25 per cent of allocated tonnage is of material ten feet or longer, in effect channeling shorter lengths in greater degree to warehouses. Those with flame-cutting equipment are utilizing this tonnage to advantage, principally for shipbuilders and subcontractors.

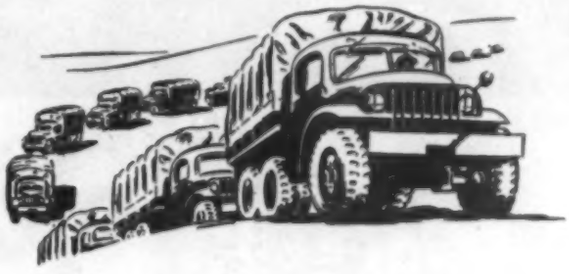
The services have placed substantial tonnage of floor plates direct, notably with Alan Wood Steel Co., Conshohocken, Pa. March deliveries to shipyards and subcontractors are heavier, largely for escort ships and landing units.

Plate mills in February established a new daily record with an average of 38,285 net tons, compared with 36,625 tons average in January. Total production was 1,072,001 tons in February, against 1,135,413 tons in January. A new monthly record seems likely for March, with 31 days, if the February rate is maintained.

Bars . . .

Bar Prices, Page 148

Users of hot carbon, cold-finished and alloys with tonnage covered by production directives are getting most of the bar tonnage delivered in the New England district. To fill high ratings, even AA-1, mills have limited capacity to roll some sizes for shipment before late second quarter, notably cold-finished large rounds or heavy flats, with alloys dragging into third quarter and beyond. Unless a directive is attached to new



Supply Trains Roll with the Help of ACP Products and Processes

Automotive manufacturers who have converted for war know the help they can get from ACP Products and Processes . . . Chemicals and their applications which grew with and contributed so much to the mass production of American automobiles.

DEOXIDINE, the acid cleaner which made mass production of all-steel auto bodies possible, is doing its war-time job on the Army's prime movers . . . preparing steel perfectly for painting, eradicating rust and neutralizing rust-producers.

KEMICK holds to and protects metal surfaces even when heated to redness . . . has been used all over the world on exhaust manifolds.

FLOSOL wets oily surfaces, is an exceptional soldering flux for steel, brass, copper, tin, terne plate and zinc.

These three are typical of the many ACP Products and Processes, well known in peacetime, that are serving in the war effort.

Others include: RODINE, the pickling inhibitor that saves steel and acid, prevents pitting and embrittlement; CUPRODINE that provides a dense, bright copper coating on steel by simple immersion; LITHOFORM for coating galvanized iron before painting to prevent peeling and scaling. These are typical ACP Products. The experience of the ACP laboratories in metal treating and finishing processes is at your service.

AMERICAN CHEMICAL PAINT CO.
MAIN OFFICE AND WORKS AMBLER . . . PENNA.
ACP
DETROIT, MICH., 6235 Palmer Ave., E.
CANADIAN BRANCH WALKERVILLE . . . ONT.

orders, prospects for early delivery are dim; ratings mean less with capacity heavily engaged on directives, coupled with limitations on tonnage of hot-rolled for cold-finishing with some integrated suppliers. Bessemer deliveries are still somewhat better than open hearth and moderate progress is being made in switching scattered specifications. Substantial part of current tonnage has directives, especially so-called duration contracts, and in smaller sizes; warehouses are accepting most of quotas, including cold-finished up to two-inch, smaller alloys and hot-rolled up to three-inch. Substantial part of tonnage for forge shops has directives attached, especially for aircraft. Heavy demand for bars in the tungsten range of 3½ to 5 per cent die stock steel is maintained for drawing operations on cartridge cases and bullet jackets, required in great numbers for small arms ammunition. High carbon steel dies do not produce the number of draws delivered by tungsten tool steel stock.

Farm machinery and equipment quotas have been increased practically 100 per cent for second quarter. This action was taken by WPB on recommendation of Secretary of Agriculture Wickard who cited needs for increased food production. Implement manufacturers require large tonnages for bars many of alloy composition for larger machines, the latter being difficult to obtain.

BEARITE

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Pipe . . .

Pipe Prices, Page 149

Shipbuilding in the aggregate accounts for a large part of current demand for steel pipe and tubing, direct shipments predominating with buying centralized for some types of craft. Distributors are doing a fair fill-in volume with yards. Lack of building restricts inquiry for butt weld. Scattered price shading on direct carlots is reported in New England, distributors sacrificing slightly on margins; quotations on stock pipe are not involved and mill prices are firm.

Most re-sellers have better balanced stocks of both butt and lap weld. But one mill quoted on approximately 30,000 seamless boiler tubes for the services recently, mostly for the Navy. Seamless tubes remain among the tightest of tubular products, and, while welded and even lap weld material is substituted for pressure work, limited semifinished available keeps the latter two tight. Welded tubing is being substituted for seamless increasingly. In connection with seamless boiler tubes it is pointed out that while the product is scarce now, the future market is steadily influenced by the trend toward diesel power for both railroads and ships, also the movement toward purchased power by many industrial plants has eliminated individual power units in many instances, thus reducing tube needs. The average life of tubes used by railroads is much longer than formerly, due to better water control and repair methods; tubes last seven to eight years and even longer with some carriers.

Rails, Cars . . .

Track Material Prices, Page 149

A flurry of locomotive orders is noted, with indications that locomotive builders will be substantially engaged throughout the year. Domestic railroads, it is asserted, are not scheduled to get as much new motive power as they think they need but they nevertheless are scheduled to receive a substantial number and these, combined with heavy orders for shipment overseas, will give locomotive builders a stiff program over the remainder of 1943, although not necessarily capacity operations.

The outstanding single award involves fifty 2-10-4 freight locomotives, which the Pennsylvania plans to build in its own shops. Other contracts include twenty 2-8-8-4 locomotives for the Baltimore & Ohio, twenty 4-8-8-2 passenger and freight locomotives for the Southern Pacific, ten 4-8-4 freight locomotives for Atchison, Topeka & Santa Fe, and five 2-10-4 freight locomotives for the Bessemer & Lake Erie, all reported placed with Baldwin Locomotive Works, Eddystone, Pa.

These orders and others recently placed are believed to end domestic buying for delivery this year.

Structural Shapes . . .

Structural Shape Prices, Page 149

Heavier shape deliveries in the second quarter will be due to shipbuilding needs, with some allocations expected to continue on a basis of delivery. From a tonnage capacity standpoint, shape mills are not operating full, but on certain sizes of ship channels some units are well loaded. The nature of current

demand includes more pieces per ton.

Few structural fabricating shops are engaged on regular work, backlogs having disappeared, but many in the East have taken on subcontracts in the war program, notably for ships. Bomb storage, bomb elevators, davits, bulkheads, racks and other ship assemblies are keeping many shops fairly busy.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 149

Three contracts in the New York district calling for 2165 tons of reinforcing bars have gone to new billet steel. Combination of circumstances in the New York metropolitan area, which includes Long Island, two nearby counties and all of northern New Jersey operate against acceptance of rail steel reinforcing. Union regulations require that all bars ⅝-inch and smaller must be cut on the building site, also all bending must be done on the site. This operates against the use of rerolled rail steel and distributors with substantial stocks of new billet bars, shading prices around $2 a ton, makes new billet the cheaper. Sellers without new billet inventories, however, are unable to compete. Apparently as long as new billet bars are available and price shading continues, coupled with cutting and bending restrictions, rail steel consumption will be light.

Pig Iron . . .

Pig Iron Prices, Page 150

Reduced demand for pig iron from cast iron pipe and machine tool foundries has been offset by increased allocations to foundries serving railroads and agricultural implement suppliers, as well as increased activity among foundries providing military items.

Increased blast furnace capacity scheduled to be brought in this year and better inventories of scrap lead some observers to feel that pig iron will be more plentiful. Another important factor, which may reduce supply, is the likelihood that about 75 stacks probably will be blown out this year for relining, against 45 in 1942.

Conditions under which sellers of gray iron castings may apply for adjustment of their maximum prices have been specified by Office of Price Administration, to fit them more closely to industry needs and make possible quicker and more localized decisions. Applications are to be filed with OPA regional administrator who in appropriate circumstances may decide them. Ways of granting relief include adjustment of maximum prices of individual or groups of castings sold at single or flat prices, of all castings sold by the applicant or by adjusting the formula method for determining maximum prices.

The applicant must show that his maximum price is below production cost, that the castings are necessary to the war effort, that he has entered into or proposes to enter into government contracts and that unless adjustment is granted he will stop production and as a result the purchaser will be materially handicapped.

Scrap . . .

Scrap Prices, Page 152

American Iron and Steel Institute views the situation in steel and iron scrap supply for 1943 as better than last year. It reports 3,831,000 tons held in yards of steelmakers Jan. 1, sufficient for about four and a half weeks, about 2,000,000 tons more than stocks March 31, 1942. With large tonnages in yards from the general scrap drive last fall, increased industrial scrap and material brought back from battlefields the outlook for ample supply is considered safe, in face of probable larger requirements from last year.

Because scrap consumers in the Buffalo district have fairly large reserves scrap normally moving to that center from further east is being allocated to other districts where the situation is not as easy. No pressure for delivery is being exerted and several consumers maintain a ban on turnings and blast furnace grades.

Cold and snow last week practically stopped preparation and movement of scrap in the St. Louis district and consumers have depended on inventory. No interruption of steel production has resulted.

In eastern Pennsylvania scrap shipments are relatively light, with heavy breakable cast decidedly scarce and heavy melting steel under increasing demand. Most mills have comfortable supply but are showing greater interest as the labor situation threatens to limit deliveries in the spring. One yard in the Philadelphia district last week lost 17 men to a government construction job nearby.

Steel Division of War Production

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Board reports progress in handling alloy steel turnings, which have proved troublesome because of difficulty of segregation, light weight and restrictions on permissible alloy in NE steels. The division reports that 32,355 tons of such turnings were allocated during February, an increase of nearly 30 per cent over January. It is hoped that 100,000 tons of alloy turnings per month may be distributed soon.

Warehouse . . .

Warehouse Prices, Page 151

Relief is promised steel warehouses by amendment to order M-21-b, liberalizing its provisions. The aim is to facilitate building of stocks before CMP becomes effective. It permits acquisition of restricted quantities of any product in excess of established quotas for first quarter. The amendment permits warehouses unable to maintain inventories because of inadequate receipts in 1942 to accept deliveries of any product classification until March 31, provided they are not in excess of the deficiency on all products classifications for 1942.

To permit deliveries from idle or excess inventories, plate quotas are increased from 100 to 135 per cent in California, Oregon and Washington and to 125 per cent in other states. Wire rod quotas are eliminated because of small volume. Warehouses are permitted to obtain seconds from any producer able to serve them. Previously such shipments were limited to producers from whom they were purchased in 1940.

Tin Plate . . .

Tin Plate Prices, Page 149

Tin plate orders continue sufficient to keep mill production schedules full, although not what normally is regarded as heavy for this season. Expectation is that demand will continue on the present basis through April, with an increase in May and June. Heavy demand is met for both hot-dip and electrolytic plate for manufacture of lids for cans. Doubts are arising whether glass container and closure manufacturers will be able to meet demand expected to be put on them to make up for smaller output of tin cans.

Iron Ore . . .

Iron Ore Prices, Page 151

January production of usable iron ore in the United States is reported by the Bureau of Mines at 3,214,043 net tons, a decrease of 4 per cent from the 3,352,559 tons mined in December. Shipments decreased from 1,696,460 tons in December to 1,360,478 tons in January, a decline of 20 per cent. Stocks at mines increased from 4,078,622 tons to 5,934,000 tons, a rise of 45 per cent. Most of these stocks were at mines in the Lake Superior district.

Michigan, chiefly from underground mines, led with a total of 1,253,734 tons. Minnesota produced only 468,642 tons. Alabama mined 800,479 tons, New York and Pennsylvania 252,959 tons and Wisconsin 128,828 tons. Alabama is able to ship more ore than any other state during winter months and in January moved 807,152 tons. New York and Pennsylvania in the same month shipped 207,213 tons. Lake Superior mines, because of cold weather, shipped a comparatively small amount.

During last quarter of 1942 a total of 1,096,000 tons of ore was reported for use as charge and finishing ore in steelmaking furnaces. This includes direct mine shipping ore, sorted lump and concentrates and sinter produced at mines. The total of steel-furnace ore was about 4 per cent of total production during that period. In addition an estimated total of 200,000 tons of sinter was produced by Universal-Atlas Portland Cement Co., Buffalo Sintering Co., and Tennessee Copper Co. during last quarter, 1942. The first two use Lake Superior ore and the latter pyrite ash.

Equipment . . .

Boston—With pressure slightly eased for machine tool deliveries and shipments well ahead of orders, supply of most cutting tools, attachments, including high speed units, reamers, twist drills, end mills, milling cutters, taps and dies is becoming tighter; deliveries on some of these with New England shops range up to 10 months. Demand is heavy and increasing. The 500,000 new machine tools placed in production during the last two years make necessary a steadily mounting demand for metal cutting tools, which has not yet reached a peak.

With all new machine tools, and most older units operating on overtime schedules, some at 24 hours per day, there are no indications of early subsiding in cutting tool requirements. Extended deliveries are due to limitations

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in capacity, although most shops have extended at least once and some several times; available steel supplies with most shops are ample, with scattered exceptions, but producers are so heavily booked little progress is possible toward reducing backlogs.

As to deliveries, shops outside New England average slightly better, although plants in this district are operating 24 hours daily in most instances. Not only are large inquiries out for private industry, but purchases by procurement officers of the services are tremendous, notably by the Navy purchasing office, New York.

New York—Machine tool shipments, maintained at a high rate, are heavier with some builders and in numerous instances are double current orders. Close to 75,000 units will be delivered in first quarter. Decline in buying is emphasized when compared with earlier peak war demand, although orders now are well in excess of normal buying. Considerable demand is developing for replacement, which up to now has been deferred by uncertain deliveries. An important move is replacement of much obsolete machine tool equipment at navy yards, units in service 15 years or more. Changes in the war program also increase machinery requirements. Most of the larger lists for aircraft plants, including engine builders, have been placed, but large contracts for tools at a Kansas City engine plant continue.

Aircraft requirements are given first consideration in production schedules and deliveries and the decline in orders from that industry is less evident than for most others. However, a mechanized war will not allow the machine tool industry to become static and the current backlog of the industry, now six to seven months, will recede more slowly than might be expected. While ability of machine builders to make deliveries differs materially as to individual shops, more units can now be shipped earlier.

Pacific Coast . . .

Seattle—Scrap in ample volume is reported by rolling mills, increased quantities being furnished by shipyards. In addition, large stockpiles of less desirable materials, collected from homes and plants in recent drives, are also available. This is expected to flow into mills for about three months. Within 60 days three new electric furnaces are scheduled to open here and in Portland. These plants will consume more than 10,000 tons a month and will require a steady supply. Buyers report the situation well in hand and expect sufficient scrap to carry them through the emergency.

The reinforcing market continues flat. Mills are rolling merchant bars steadily and report large backlogs. Most of this demand comes from shipyards.

Fabricators report no improvement in demand for shapes and no contracts of importance are pending or in prospect.

Tacoma officials are worried over threatened increase in the cost of Nisqually power project No. 2 from $7,000,000 to $11,000,000. They plan to appoint an engineering board to survey the situation and make recommendations. City council has rejected a proposal that government aid be asked on the ground that this is a war project. The city plans to complete the improvement, providing its own funds.

Alaska Junk Co., Seattle, was the sole bidder to State of Washington for purchase of 3700 tons of steel cable salvaged from the Narrows bridge. The offer was $18.75 per net ton, a total of $69,523.

Wilkeson Products Co. announces production will start this month at its new coke plant at Tacoma. The company has also added new equipment and facilities at its Wilkeson coal mine, installing a washing house and other facilities, increasing daily output to 400 tons. At the coke plant gas will be produced for the ovens and also for sale to other utilities.

King county water district No. 20 opened bids March 10 for an $11,000 extension involving 5300 feet of 4-inch cast iron or used steel pipe. Plans are by Gardner, Gardner & Hitchings, Seattle.

Unstated tonnage of shapes is involved in a contract for altering girders and fabricating additional material for three steel bridges on the Eatonville branch, relocation project, Milwaukee railroad. Bids were opened at Tacoma March 10.

U. S. engineers in Portland and Seattle have awarded additional contracts. The former has placed a contract in excess of $100,000 for construction of a sewage treatment plant in Deschutes county, Oregon.

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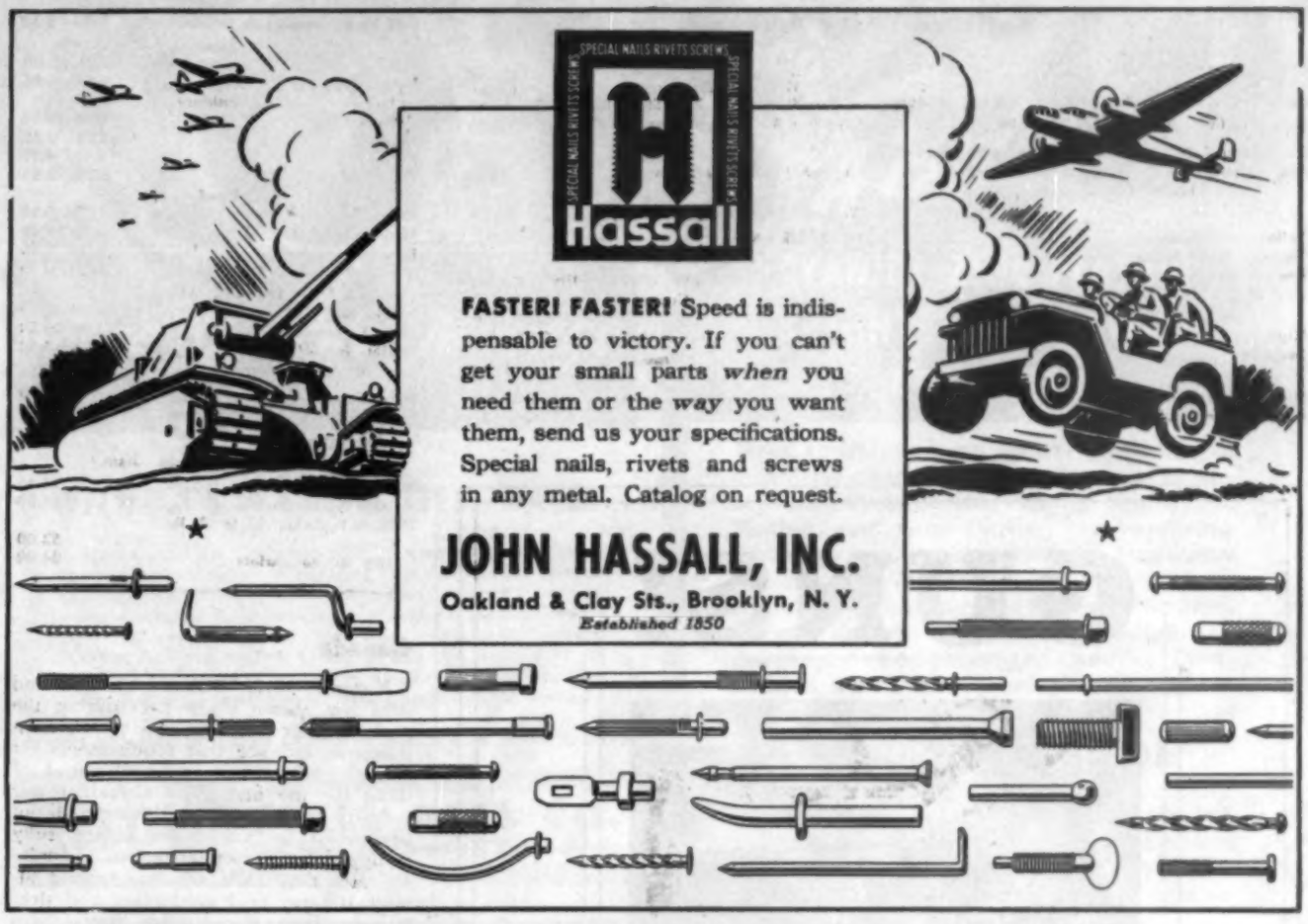
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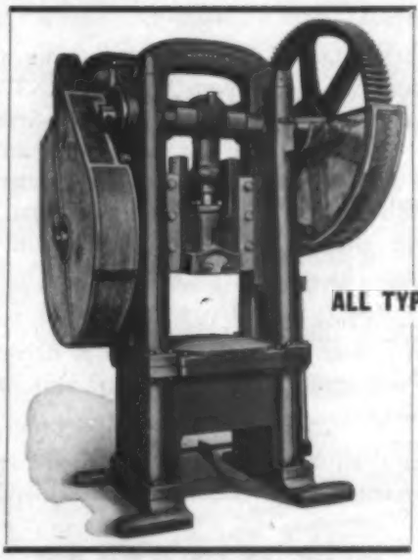

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Zinc	
Old	4.75- 5.00
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Aluminum	
Clippings	9.75-10.25
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Stereotype, Linotype	6.00- 6.75
Tin and Alloys	
Block tin pipe	44.00-46.00
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Brass ingot, 85-5-5-5, l.c.l.	12.50
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MAGNESIUM (12 pound rod, 4 in. diam.)	
99.8% ingot, carlots	22.50
100 lb. to carlots	24.50
Extruded sticks, ¼ to 2 lb.	
Carlots	32.00
100 lb. to carlots	34.00

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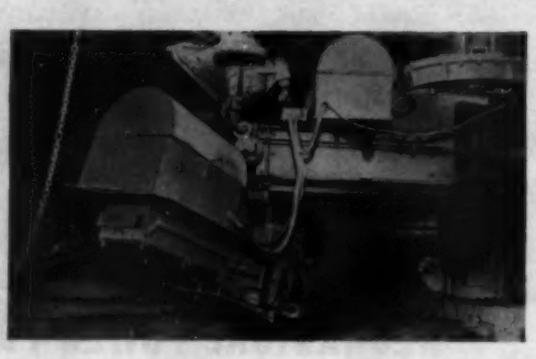

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Canada . . .

Toronto, Ont.—Demand for iron and steel has shown sharp gain during the past week or ten days and recent commitments indicate that requirements for second quarter will run well ahead of those for the first. The Canadian war industry is now settling down to all-out production with most plants fully equipped for maximum output. Despite the fact that mills are maintaining almost 100 per cent production and steel imports from the United States have been enlarged there is still a shortage of some materials with little prospect of being relieved until additions, now underway have been completed, within the next three or four months. Further restrictions have been placed on civilian goods to conserve steel.

With the government entering a program of oil tanker construction, and conversion of several of the new 10,000-ton cargo vessels into tankers, a sharp increase in plate demand is indicated, to which is added large consumption by rolling stock and boiler makers, all of which are in the top priority group.

Sheets continue in brisk demand and mill representatives report backlogs in excess of production for second quarter.

Bar production has shown improvement recently, reflected in better deliveries. While supply is said to be ample for current needs no large surplus stocks have been established. Recent orders favored high carbon and alloy bars, with commitments running past second quarter, although deliveries are from six to eight weeks on war orders. Mill representatives report no actual shortage of bars and that bar mills are maintaining full time production.

Steel in Europe

London — (*By Radio*) — Substantial business has been placed with steel mills in Great Britain for second quarter delivery. Rerollers need larger supply of semifinished steel to maintain production. Plate deliveries are becoming more extended. Alloy steel products are in heavy demand. Activity is increasing in structural shapes to meet constructional and shipbuilding demand.

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NEW BUSINESS

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

SUB-CONTRACT OPPORTUNITIES

Data on subcontract work are issued by regional offices of the War Production Board. Contact either the office issuing the data or your nearest field office. Write, don't telephone, and mention key letters and numbers appearing before each item to assure prompt attention and avoid delay.

New York office, Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-9-9479: Landing gear retracting cylinder assembly. A Long Island corporation is seeking subcontracting facilities for landing gear retracting cylinder assembly. Equipment indicated, 10 x 24-inch external cylindrical grinder, three-inch bar horizontal boring mill, No. 2 miller, Heald 50 or 75A 5, turret lathe, drill press.

S-9-9493: Slotting machine. A Brooklyn manufacturer is seeking subcontracting facilities to slot a rectangular hole which requires a slotter with a 16-inch stroke or over. Weight of the part requires a hoist for lifting purposes.

S-9-9829 to 9835: Screw machines. Buffalo aircraft manufacturer requires screw machines for making pieces of Dural, brass and cold-rolled steel, cadmium plated. Quantities from 5000 to 75,000 pieces per month.

Minneapolis office, Contract Distribution Branch of WPB, 334 Midland Bank building, is seeking contractors for the following:

S.O. No. 366: Marine anchor chain, 1½-inch stud links in 30-fathom shots, links 8½ inches long, weight 15 pounds. Operations, forging and welding. Quantities, large. Deliveries to start at once and continue for duration. Priority, AA-1. Material wrought iron, marine specification. Bid by negotiation. Drawings and specifications supplied.

S.O. No. 367: Connectors for tank tracks. Operations, forging, machining, heat treating. Quantities, very large. Deliveries, up to 30,000 monthly. Tolerance, commercial; 331 to 375 Brinell. Priority, AA-1. Drawings and specifications available.

S.O. No. 353: Parts; Diaphragm pumps (2300 pounds), thickener (7500 pounds). Equipment, foundry and machine shop; vertical boring mill, 4 feet 6 inches; lathe to take 6-inch XX pipe, center shaft, 33 feet long; planers; shapers; radial drills, welding equipment. Quantities, 12 or 26. Delivery, 4 to 3 months. Priority, AA-3 or better. Drawings and specifications are available.

S.O. No. 365: C.P.O. berths, marine (1); crew berths, marine (2). Equipment, tube bending equipment. Quantities (1) 1656; (2) 8280. Deliveries start May 1. Priority, AA-1. Drawings and specifications available.

S.O. No. 369: Parts, screws. Equipment, automatic screw machines No. 00, No. 0. Quantity 750,000. Deliveries to start at once, 100,000 per week. Material, cold-rolled steel 1040, 3/16-inch. Priority, AA-1. Drawings and specifications available.

S.O. No. 356: Machining of steel forgings. Equipment, No. 4 vertical or horizontal miller, drill with No. 3 Morse taper. Quantities large. Deliveries, monthly. Materials furnished.

S.O. No. 361: Part, recoil cylinder, 5 inches diameter, 38 inches long. Equipment, horizontal boring mill 3-inch or larger, No. 3 miller, welding equipment. Operations, boring and honing of wide diameter I.D.; machining of various brackets; welding brackets to O.D. Quantities large. Tolerance, .001. Material, forgings, furnished. Drawings available.

S.O. No. 368: Machine tool services wanted. Equipment, 8 to 10 engine lathes, 18 to 22-inch, preferably in one shop. Quantity, four months work for eight lathes. Material supplied. Drawings and specifications furnished by prime contractor.

Chicago office, Contract Distribution Branch of WPB, 226 West Jackson Boulevard, is seeking contractors for the following:

Alloy Steel Gear & Pinion Co., 4847 West Division street, Chicago, attention A. E. Davey. Priority AA-1. Job requires gear cutting only. Contractor prefers work done on the 12-inch new type Gleason gear generator. Backlash .002 to .004-inch. Runout equal O. Production requirements 100 sets per week. Contractor furnishes manganese bronze blanks. Quantity, 1500 each of two sizes, 4⅛ x 11 and 6 x 11 inches.

American Gear & Mfg. Co., 6645 West Sixty-fifth street, Chicago, attention N. A. Klipper. Priority AA-1. Job covers rough turning of bevel gear blanks. Five items, 1250 pieces each. Contractor furnishes 1040 cold-drawn steel. Equipment, turret lathes, 1⅛, 2½ and 3-inch bar capacity.

Carbide Tool Co., 816 North Kostner avenue, Chicago, attention Frank E. Walko. Priority AA-1. Job covers grinding only of carbide tools. Dimensions must be checked with sectional gages, comparator or radius gage and toolmaker's microscope. Grinding wheels required are Carborundum brand silicon carbide green grip wheels and Norton diamond charged wheels. Contractor supplies tools ready for grinding. Quantity, 25. Size, 1⅛ x 3½ inches. Equipment, 6 x 18-inch surface grinder.

Consolidated Aircraft Corp., Municipal Airport, Tucson, Ariz., attention D. R. Bechtel. Priority AA-1. Job requires sleeves in various sizes, dural or brass, furnished by contractor. Quantity, various, from 5000 to 500,000. Production requirements 25 per cent in 30 days, remainder in 60 to 90 days. Equipment, single-spindle automatic screw machines ⅝ to 1¼-inch capacity. Tolerance, .003.

Daiber-Jensen Inc., 419 First avenue South, Seattle, Wash., attention Ome Daiber. High priority. Material hot-rolled steel. Quantity 10,000. Part, cleat section of Crag nail for mountain troops. Subcontractor to do entire job, including furnishing material. Equipment, upsetting forging machine.

Clearing Machine Co., 6499 West Sixty-fifth street, Chicago, attention C. E. Novinger. Priority AA-1. Part, large fabricated crown. Three parts which must be done on one machine as they form part of a complete unit. Contractor furnishes fabricated parts. Quantity, two of each part. Equipment, eight-inch spindle horizontal boring mill. Material cold-rolled steel. Tolerance, .013.

Servel Inc., Evansville, Ind., attention F. G. Krach. Priority AA-1, army aircraft. Part, winged nut. Quantity 9000 pieces at 3000 per month beginning in April. Subcontractor may furnish castings only or castings completely machined. Steel castings will be SAE 3135 or comparable analysis. Equipment, steel foundry equipment, ⅛-inch dr. capacity two-spindle bench drill.

Tuttle & Kift Inc., 1823 North Monitor avenue, Chicago, attention H. G. Knuth. Priority AA-1. Production requirements must start April 1 on special screw item. Subcontractor to do entire job, including material. Quantity, 275,000. Size ¼ x 1 inch. Material, cold-rolled steel. Equipment, ⅝-inch capacity single-spindle automatic screw machine, 6 x 14-inch T. T. hand milling machine.

Watling Mfg. Co., 4650 West Fulton street, Chicago, attention J. Watling. Priority AA-1. Part, primer body. Production requirements 15,000 to 25,000 per month. Contractor supplies material alloy steel. Size, 1 x 2 inches. Equipment, 7 x 15-inch bench turret lathe, four spindle automatic screw machine 1⅛-inch capacity.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PENDING

375 tons, Pennsylvania state overpass, Eddystone, Pa.; bids March 26.

REINFORCING BARS . . .

REINFORCING STEEL AWARDS

1780 tons, defense project, off east coast, to Truscon Steel Co., Youngstown, O.

230 tons, defense project, Perth Amboy, N. J., district, to Capital Steel Co., New York.

155 tons, test building, aircraft plant, New Jersey, to Truscon Steel Co., Youngstown, O.

PIPE . . .

CAST PIPE AWARDS

100 tons, underwater project, 12-inch pipe, for Bremerton, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

RAILS, CARS . . .

RAILS PLACED

Central of New Jersey, 1000 tons, to Bethlehem Steel Co., Bethlehem, Pa.

LOCOMOTIVES PLACED

Atchison, Topeka & Santa Fe, ten 4-8-4 freight locomotives, to Baldwin Locomotive Works, Eddystone, Pa.

Baltimore & Ohio, twenty 2-8-8-4 locomotives, to Baldwin Locomotive Works, Eddystone, Pa.

Bessemer & Lake Erie, five 2-10-4 freight locomotives, reported placed with Baldwin Locomotive Works, Eddystone, Pa.

Pennsylvania, fifty 2-10-4 freight locomotives, to its own shops.

Southern Pacific, twenty 4-8-8-2 passenger and freight locomotives, reported placed with Baldwin Locomotive Works, Eddystone, Pa.

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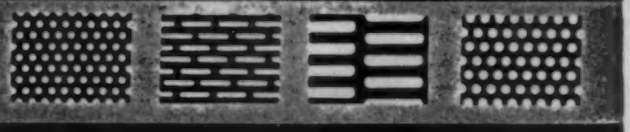

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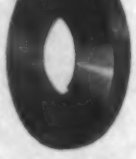
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CONSTRUCTION AND ENTERPRISE

MICHIGAN

DEARBORN, MICH.—Austin Co., 429 Curtis building, Detroit, has contract for addition to factory at 8101 Tireman, for American Blower Co.

DETROIT—Gerity-Wayne Tool Co., 6432 Cass avenue, has been incorporated to deal in tools, by James Gerity Jr., Adrian, Mich.

DETROIT—Harry D. Osgood & Co., 3600 Fourth street, Royal Oak, Mich., has been awarded contract for repairs to factory at 13788 Buena Vista, for Columbia Steel Treating Co.

DETROIT—R. E. Dailey & Co., 4300 Oakman boulevard, has been awarded contract for alterations to sewage pumping station at Kerby road and Chalfonte avenue for the Board of Wayne County Road Commissioners.

DETROIT—Truscon Steel Co. has let contract to O. W. Burke Co., 1101 Fisher building, for furnace foundations for steel mill to be located at 7485 Central avenue. Estimated cost $32,000.

MONROE, MICH.—Giffels & Vallet Inc., is preparing plans for additions, alterations and new buildings at plant here for Aluminum Co. of America. Darin & Armstrong Inc., 2041 Fenkell, Detroit, general contractors.

CONNECTICUT

BRIDGEPORT, CONN.—Harry Maring Jr. Inc., 536 Lindley street, Bridgeport, has been awarded contract by an industrial company for converting truck terminal into manufacturing plant.

HARTFORD, CONN.—Terry Steam Turbine Co., 874 Windsor street, has let contract for one-story factory addition to Bartlett-Brainard Co., 103 Woodbine street. Estimated cost $40,000.

STRATFORD, CONN. — Vought-Sikorsky Division United Aircraft Corp., 550 Main street, will soon take bids for plant costing about $40,000. Albert Kahn Associated Engineers & Architects, 345 New Center building, Detroit, engineers.

NEW JERSEY

GARFIELD, N. J.—Accurate Mfg. Co., 44 Hepworth place, will soon let contract for one-story boiler house. A. Rigolo, 94 Plaget avenue, Clifton, N. J., architect.

PATERSON, N. J.—Carl Kemm Loven, architect, 110 Rock road, Glen Rock, N. J., has asked bids for one-story plant addition for American Seitzfilter Co., 204 Twenty-first avenue. Estimated cost $100,000.

PERTH AMBOY, N. J.—Kincaid Mfg. Co., 17 East Forty-second street, New York, has plans by John F. Yewell, 10 East Fortieth street, New York, for one-story factory addition. Cost estimated at $75,000.

OHIO

CLEVELAND—Midwest Forge Co., Harry E. Boden, secretary, 17301 St. Clair avenue, is extending factory space with $10,000 addition.

CLEVELAND—Allied Plating Corp., John Hallack, president, 277 East 156th street, will lease new factory building being erected at 18006 Waterloo road.

CLEVELAND—Ohio Iron Works Co., 4300 Perkins avenue Northeast, is planning to increase present facilities by adding more storage room to factory at cost of $12,000. Herman Daedelou is president-treasurer.

PENNSYLVANIA

WEST HOMESTEAD, PA. — Contract for building foundations and machinery foundations for extension to steel mill here was awarded to Trimble Co., 1719 Pennsylvania avenue, Pittsburgh. Owner, United States government, Navy Department. Lessee and operator, Mesta Machine Co., Homestead, Pa.

ILLINOIS

HARRISBURG, ILL.—S. E. Illinois Electric Co-operative Inc., care of A. F. Lents, manager, plans subdivision facilities.

ROCK ISLAND, ILL.—Schenley Distillers Corp. plans construction of an industrial alcohol plant.

TENNESSEE

COLUMBIA, TENN.—City, R. W. Williamson, city manager, will expend $200,000 for extension to waterworks, including installation of pumping equipment. Freeland Roberts & Co., 926 Third National Bank building, Nashville, Tenn., engineer.

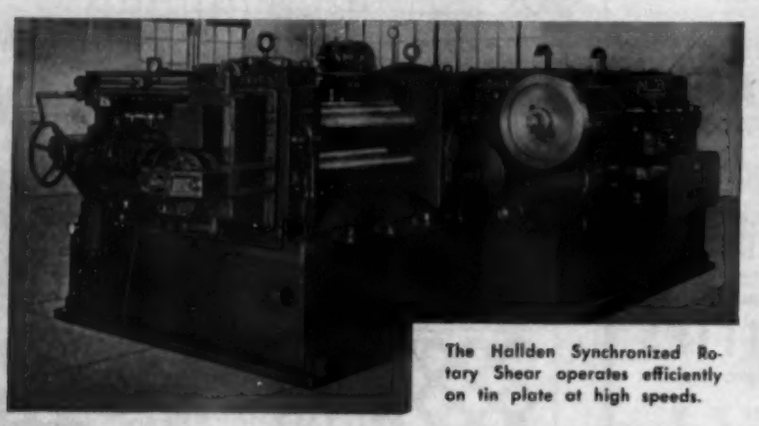
MISSOURI

ST. LOUIS—Hammer Dry Plate & Film Co., D. Craig Dailey, president, 3547 Ohio avenue, will spend over $100,000 in rebuilding portions of plant.

ST. LOUIS—Southwest Bolt & Nut Co., 1232 Hadley street, has awarded contract to Robert Paulus Construction Co., 3457 Morganford road, for one-story warehouse building.

ST. LOUIS—American Stove Co., 2000 South Kingshighway, has awarded contract to Rinehart Construction Co., 4030 Chouteau avenue, for one-story building.

ST. LOUIS—Mines Equipment Co., 4215 Clay-



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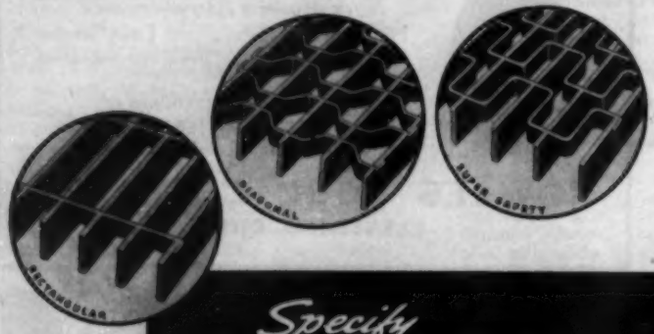

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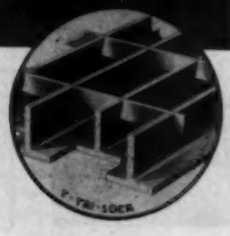

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ton avenue, has given contract to Woermann Construction Co., 3800 West Pine boulevard, for factory building at 4912 Shaw avenue.

WISCONSIN

DELAVAN, WIS.—Borg-Warner Corp., 310 South Michigan avenue, Chicago, has let contract for one and two-story factory to T. S. Willis, Hayes building, Janesville, Wis. Estimated cost $150,800. Holsman & Holsman, 140 South Dearborn street, Chicago, architects.

FOND DU LAC, WIS.—Wells Mfg. Corp. plans three-story factory, to replace plant destroyed by fire.

KOHLER, WIS.—Kohler Co. plans expansion to plant and installation of additional machinery.

MILWAUKEE—Midwest Tool & Die Co. has been incorporated by John Aeschlimann, J. Maramonte and Baldwin Simone.

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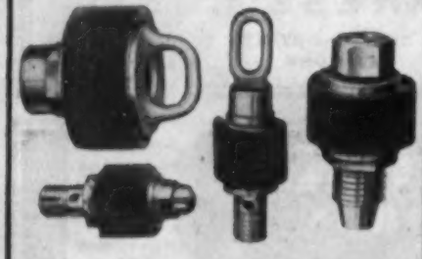

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MILWAUKEE—Lakeside Bridge & Steel Co. has begun construction of factory addition and a crane runway.

MILWAUKEE—Ampco Metal Inc. has given contract to William Keierleber Construction Co. for one-story foundry addition.

MILWAUKEE—Perfex Corp. has given contract to Permanent Construction Co. for one-story addition.

MILWAUKEE—Globe-Union Inc. has given contract to Selzer-Ornst Co., West State street, for one-story factory addition.

MILWAUKEE—Stolper Steel Products Co. plans one-story addition at plant No. 2. Frank F. Drolshagen, 647 West Virginia street, architect.

OSHKOSH, WIS.—Universal Foundry Co. has given contract to Ben B. Ganther Co. for one-story foundry addition.

WAUKESHA, WIS.—Alloy Products Corp., 241 Madison street, has let contract for one and two-story boiler house and electric substation to Permanent Construction Co., Milwaukee. Plans by Zagel, Sherman & Zagel, engineers and architects, 424 East Wells street, Milwaukee.

WEST ALLIS, WIS.—Le Roi Co. has given contract to Peters Construction Co., 2901 North Thirty-eighth street, Milwaukee, for one-story factory addition.

WEST ALLIS, WIS.—Allis-Chalmers Mfg. Co., 1126 South Seventieth street, has given general contract to Klug & Smith Co., 111 East Wisconsin avenue, Milwaukee, for one and two-story blower building.

MINNESOTA

MINNEAPOLIS—Standard Iron & Wire Works, 1900 Third street Northeast, will soon start erection of one-story factory addition.

MINNEAPOLIS—R. C. Hitchcock & Sons, patternmakers, have given general contract to Henry K. Lindahl for one-story addition.

MINNEAPOLIS—Brown Steel Tank Co., 2907 Fourth street Southeast, will soon take bids for two-story factory addition. Lang & Raugland, 502 Wesley Temple building, architects.

TEXAS

DALLAS, TEX.—Southwest Airmotive Co., 3416 Love Field, Dallas, is expanding plant at cost of between $75,000 and $100,000.

LOCKNEY, TEX.—Denver Alfalfa Milling & Products Co., Lamar, Colo., and Plainview, Tex., will build milling and processing plant here. Estimated cost $75,000.

TROUP, TEX.—General Refractories Co., Real Estate Trust building, Philadelphia, will erect manufacturing plant costing approximately $250,000.

SOUTH DAKOTA

McINTOSH, S. DAK.—Chicago, Milwaukee, St. Paul & Pacific Railway Co. has given contract to T. W. Snow Construction Co., 332 South LaSalle street, Chicago, for construction of 100,000-gallon water tank on a 30-foot tower.

IOWA

CEDAR RAPIDS, IOWA—Iowa Steel & Iron Works has begun construction of one-story addition.

CEDAR RAPIDS, IOWA—Iowa Engineering Co. has been incorporated with capital stock of $500,000 to manufacture machinery and mechanical tools of all types. Howard Hall is president, J. W. Riley, vice president, and Beahl T. Perrine, secretary-treasurer.

WATERLOO, IOWA—Hawkeye Steel Products Co., 324 Dureya street, plans to rebuild portion of plant destroyed by fire recently.

WATERLOO, IOWA—Flour City Box & Mfg. Co. has given contract to John G. Miller Construction Co. for one-story factory, to replace plant recently destroyed by fire.

WEBSTER CITY, IOWA—McColloughs Inc., Webster City, will rebuild factory at cost of $40,000, including equipment.

CALIFORNIA

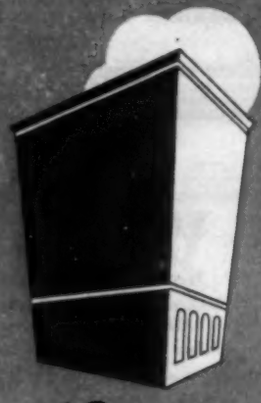
ALAMEDA, CALIF.—United Engineering Co., foot of Main street, has plans by Alben Froberg, 3454 Harlan street, Oakland, for two-story sheet metal shop, women's locker room and engineering office building, also one-story warehouse addition. Estimated cost $105,000.

BURBANK, CALIF.—Vega Aircraft Corp. will erect additions to factory at 2535 Hollywood Way, to cost $38,767.

DOWNEY, CALIF.—Vultee Aircraft Inc., 842 South Lakewood boulevard, will build addition to plant at cost of $26,000.

WASHINGTON

SEATTLE—Todd Seattle Dry Docks Co. will build addition to sheet metal shop, for which General Construction Co. has the contract.



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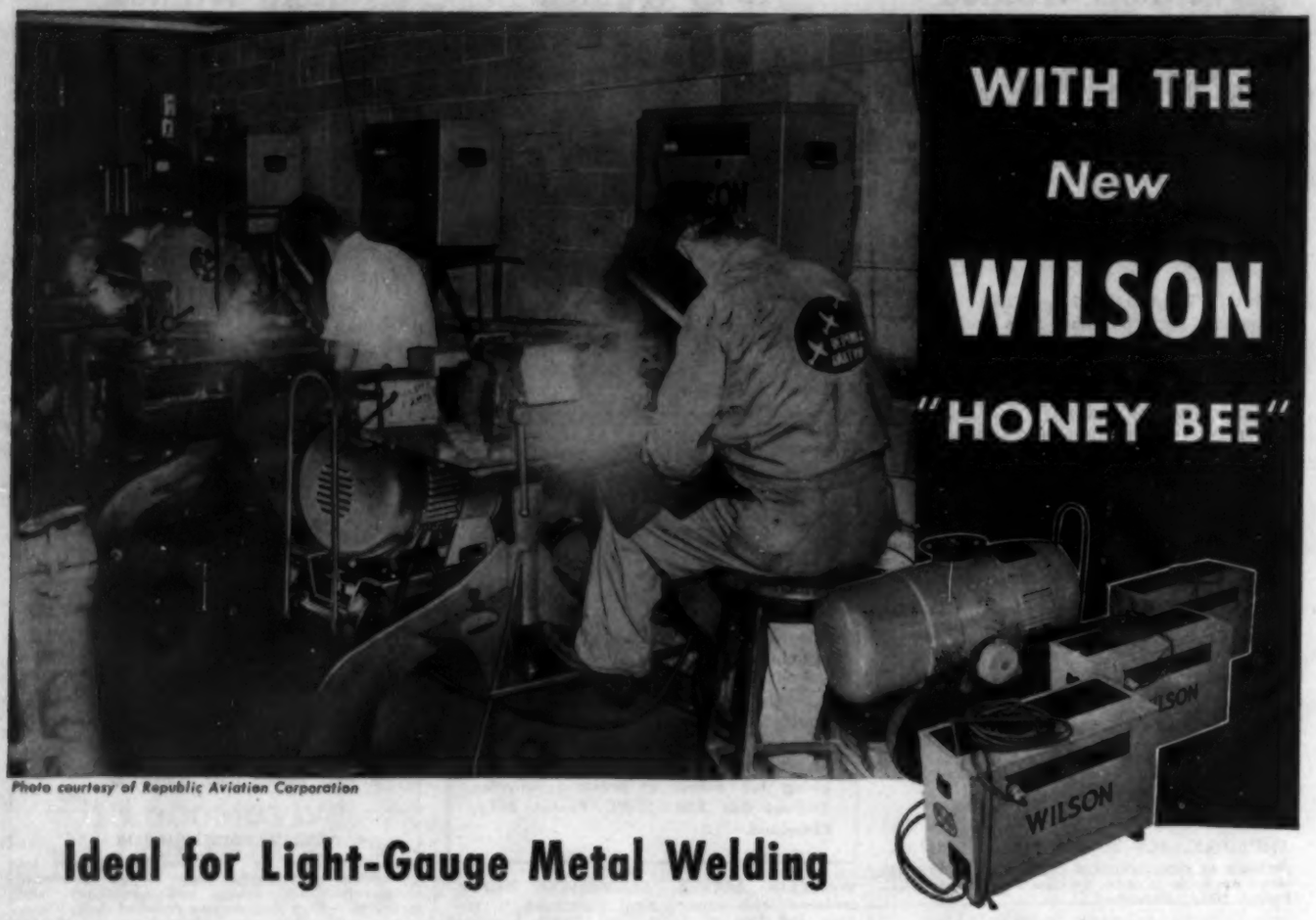

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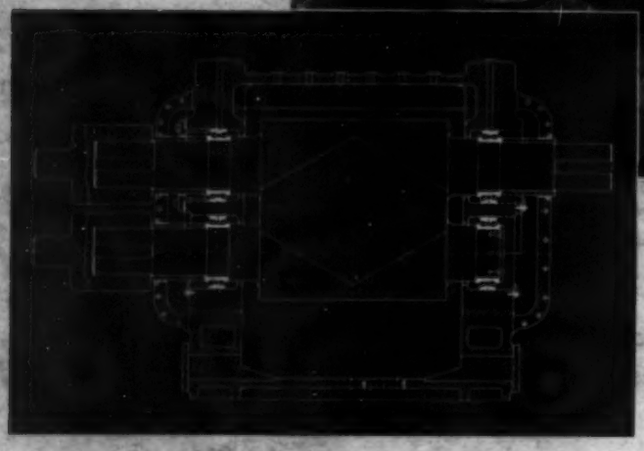

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